



# Asset Management and CMMS

*The premise of this presentation is that you can't do Asset Management properly if you're not using one of these...*



# Computerised Maintenance Management System



# Computerised Maintenance Management System

*Guys, there's  
a better way!*





**What is an Asset?**

**Why Asset Management?**

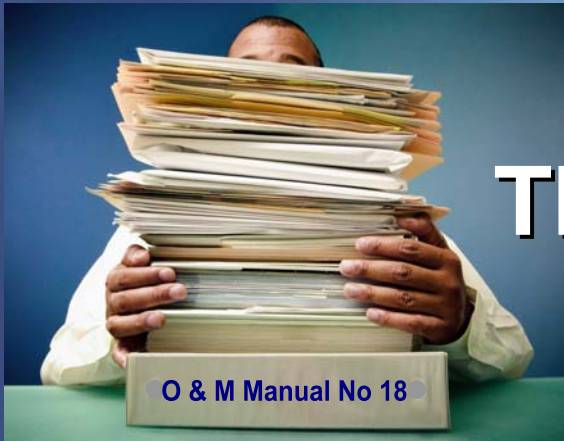
**Why do I need CMMS?**

# What is an Asset?

- Grounds, Pavements, Tracks, Structures, Buildings, Drainage Systems, Fixed Plant, Storage Facilities, Power & Utilities, HVAC, Transit Systems, Vehicles, IT & Telecoms Systems, Work Equipment, Medical Equipment, Signage, Security & Safety Systems – *the list goes on and on...*
- Assets are the essential means of production and service delivery. Nothing is achievable without them - so they need to be available on demand and reliable in service
- **ALL** assets deteriorate with age and usage. They require regular inspection, care and repair – *otherwise in-service failures will proliferate, with risks running totally out of control*
- An organisation's maintenance-demanding asset population can run into thousands of items – each one with a myriad of maintainable component parts

# Why Asset Management?

- Controlling the maintenance-demanding asset population to ensure the required levels of reliability and availability are achieved in the most economical way is a huge and onerous logistical challenge. This is the process of **Asset Management**
- Asset Management is a core business process in 'asset-intensive' organisations
- Asset-intensive organisations are those with high capital investment – Manufacturing & Processing Plants, Utilities, Airports, Hospitals, Hotels, Building Complexes, Fleets, etc
- Asset Management proficiency directly determines the level of product & service quality, regulatory compliance, public safety, operating costs, customer satisfaction, brand image and employee morale
- To sustain and improve corporate performance – whether measured by shareholder value, profitability, customer satisfaction or regulatory compliance – organisations have to become more sophisticated in their approach to Asset Management
- Because of its strategic importance, Asset Management is a matter of Governance - *it should be properly assured by Senior Management*



# The need for CMMS



# The need for CMMS

- Asset Management is arguably the most demanding of all business processes because of the enormous quantity, complexity and diversity of the technical, regulatory, resource and financial information that must routinely be handled, stored, retrieved and analysed
- There's a morass of data to collect, slice, dice and process in order to extract the on-going decision-making and control information necessary to achieve success
- Accounting Systems are not definitive enough to handle the detail required. The necessary breakdown and tracking can only be done within the Work Order system of a CMMS

# The need for CMMS

Asset Management is 90% information processing and 10% engineering

To collect, store, share, retrieve and analyse asset information effectively and efficiently, CMMS is essential...



# The need for CMMS



...the question is not  
*'Should I use CMMS?'*  
but *'Which one?'*



# The essential contribution of CMMS

# The essential contribution of CMMS



CMMS provides the framework and information tools needed to integrate an organisation's Asset Technical and Work Management activities. It's the means by which Asset failures, consequential losses, operational costs and risk can be minimised

# The essential contribution of CMMS



...making the difference between  
mediocrity and success!



CMMS provides the framework and information tools needed to integrate an organisation's Asset Technical and Work Management activities. It's the means by which Asset failures, consequential losses, operational costs and risk can be minimised

# The essential contribution of CMMS

Maintenance  
Strategy

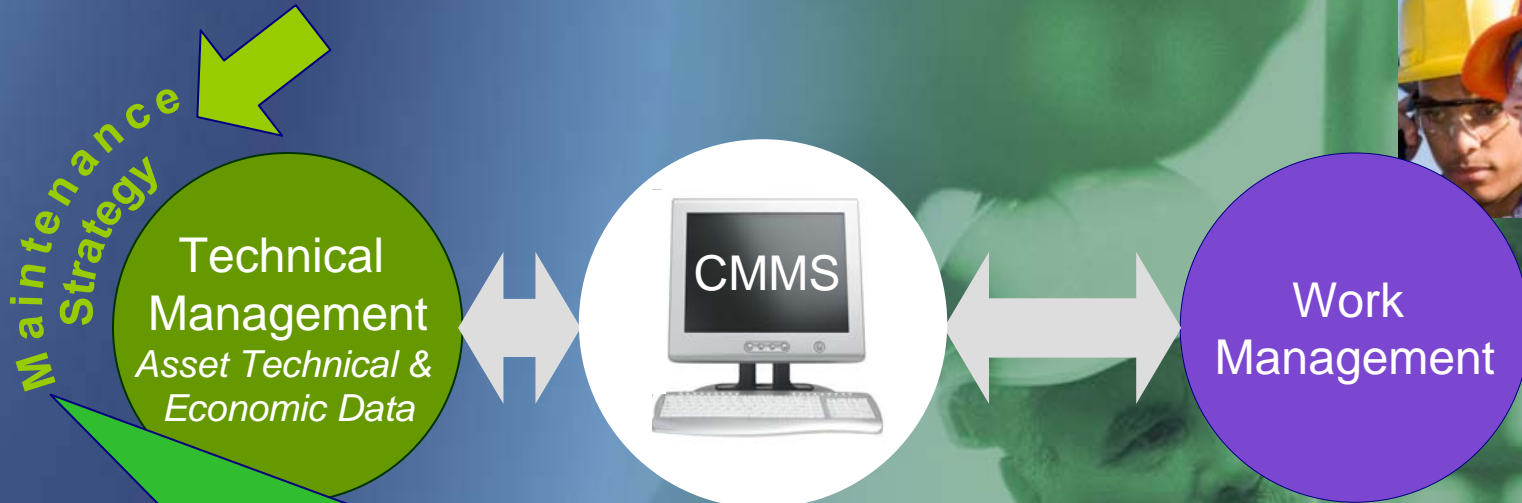
Technical  
Management  
*Asset Technical &  
Economic Data*



Work  
Management



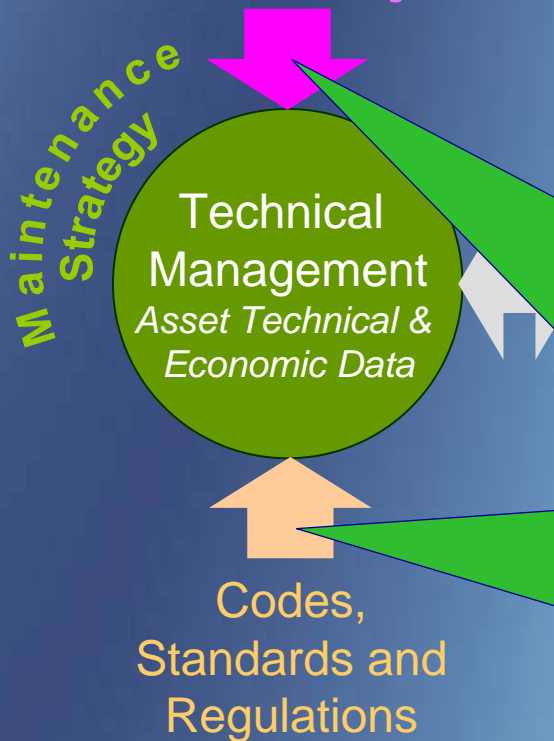
# The essential contribution of CMMS



The **Maintenance Strategy** adopted by an asset-intensive organisation - *by design or default* – ultimately determines its competitiveness. It has a critical influence on Plant Availability and Reliability, Process and Quality Capability, Unit Costs, Regulatory Compliance and Operational Risk

# The essential contribution of CMMS

## Business Objectives

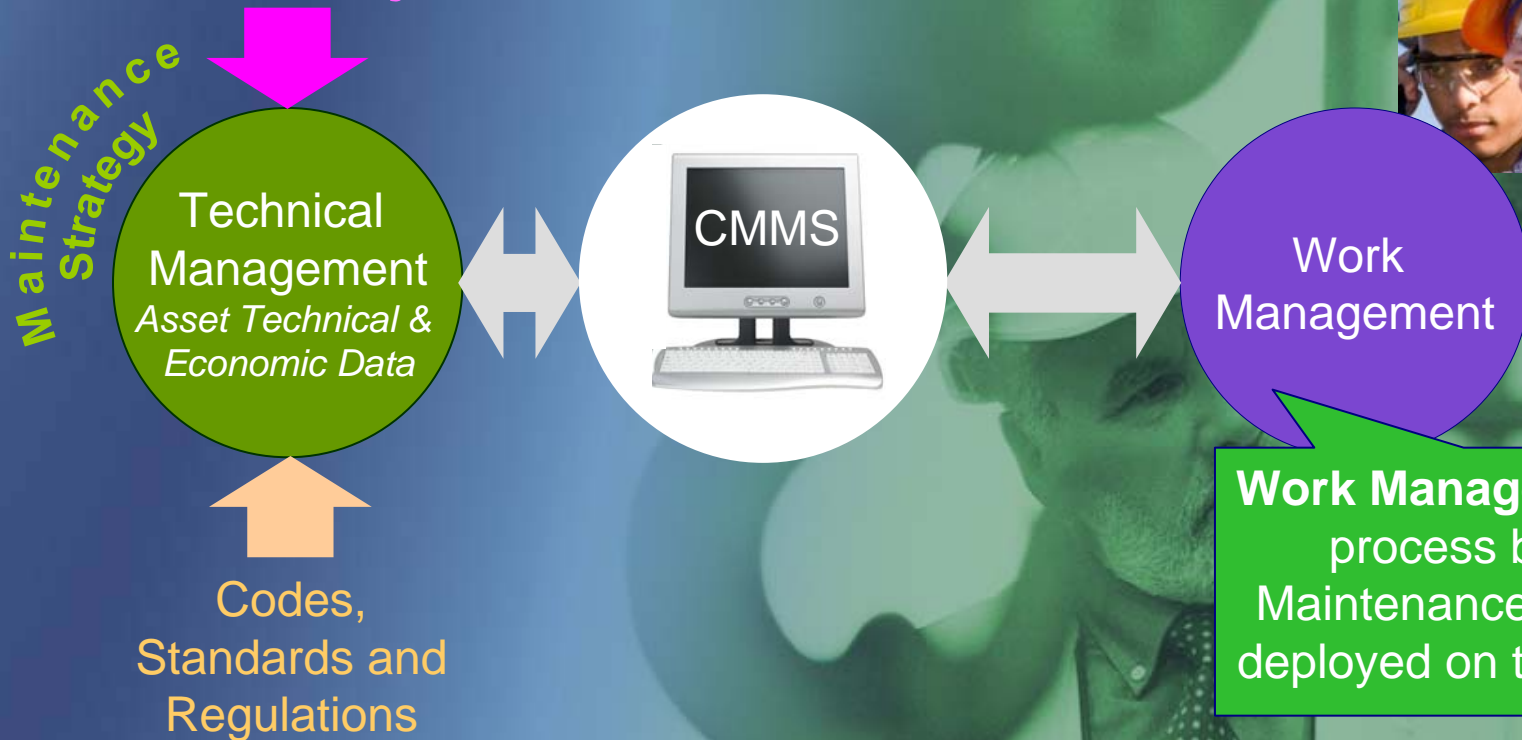


The formulation of a coherent **Maintenance Strategy** is guided by Business Objectives and compliance with Regulatory and other external requirements. It provides the logical basis on which failure-countering, business-aligned **Preventive Maintenance Plans** for the organisation's Assets can be devised. **It's all about mitigating and controlling risk!**



# The essential contribution of CMMS

## Business Objectives



**Work Management** is the process by which Maintenance Strategy is deployed on the ground...

# The essential contribution of CMMS

## Business Objectives



Codes,  
Standards and  
Regulations

...the process by which PM Plans are realised, asset defects, corrective maintenance repairs and modifications are administered and all event and work history is collected for technical and economic reporting and **analysis**

# The essential contribution of CMMS

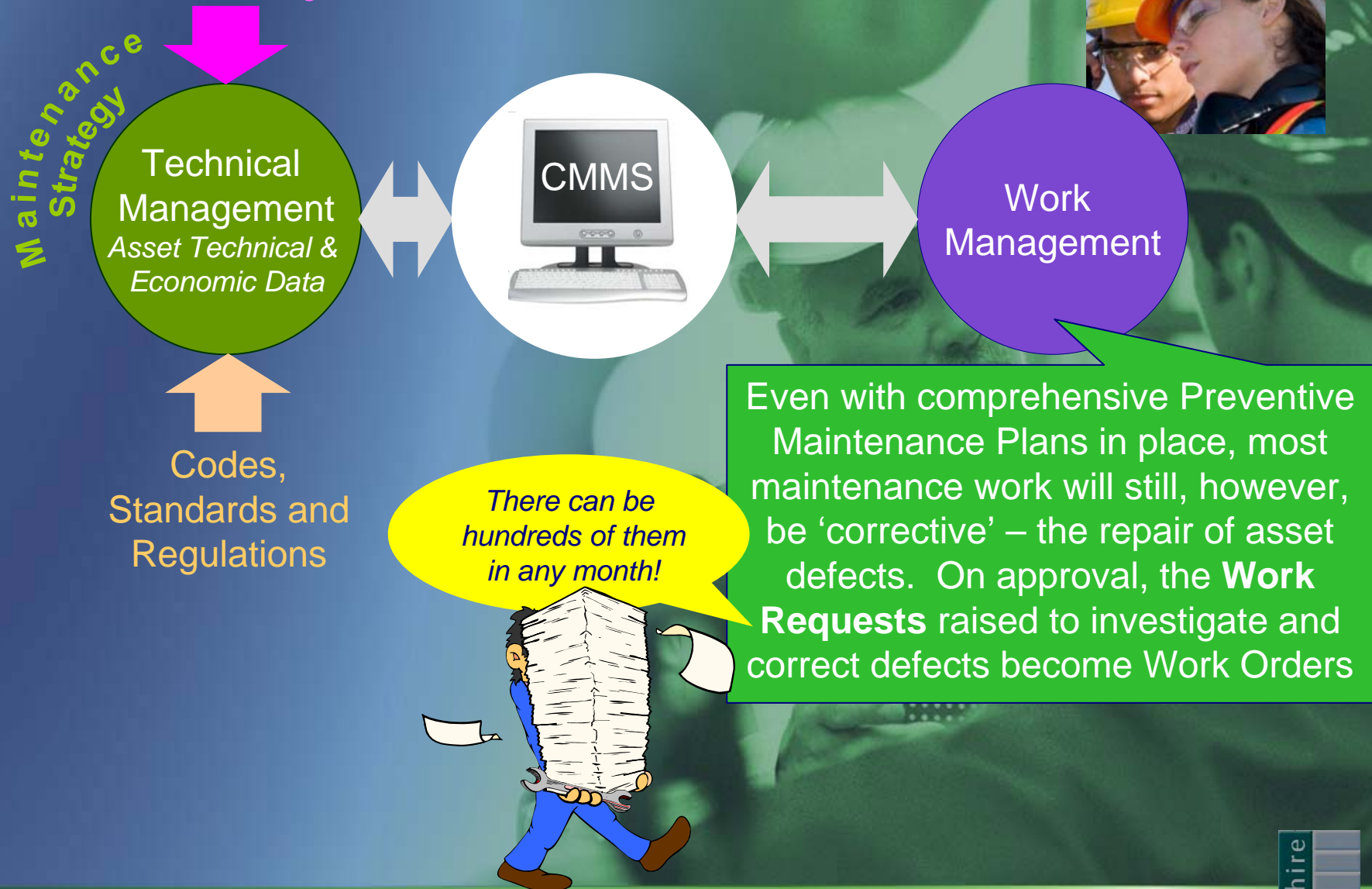
## Business Objectives



Even with comprehensive Preventive Maintenance Plans in place, most maintenance work will still, however, be 'corrective' – the repair of asset defects. On approval, the **Work Requests** raised to investigate and correct defects become Work Orders

# The essential contribution of CMMS

## Business Objectives



# The essential contribution of CMMS

## Business Objectives



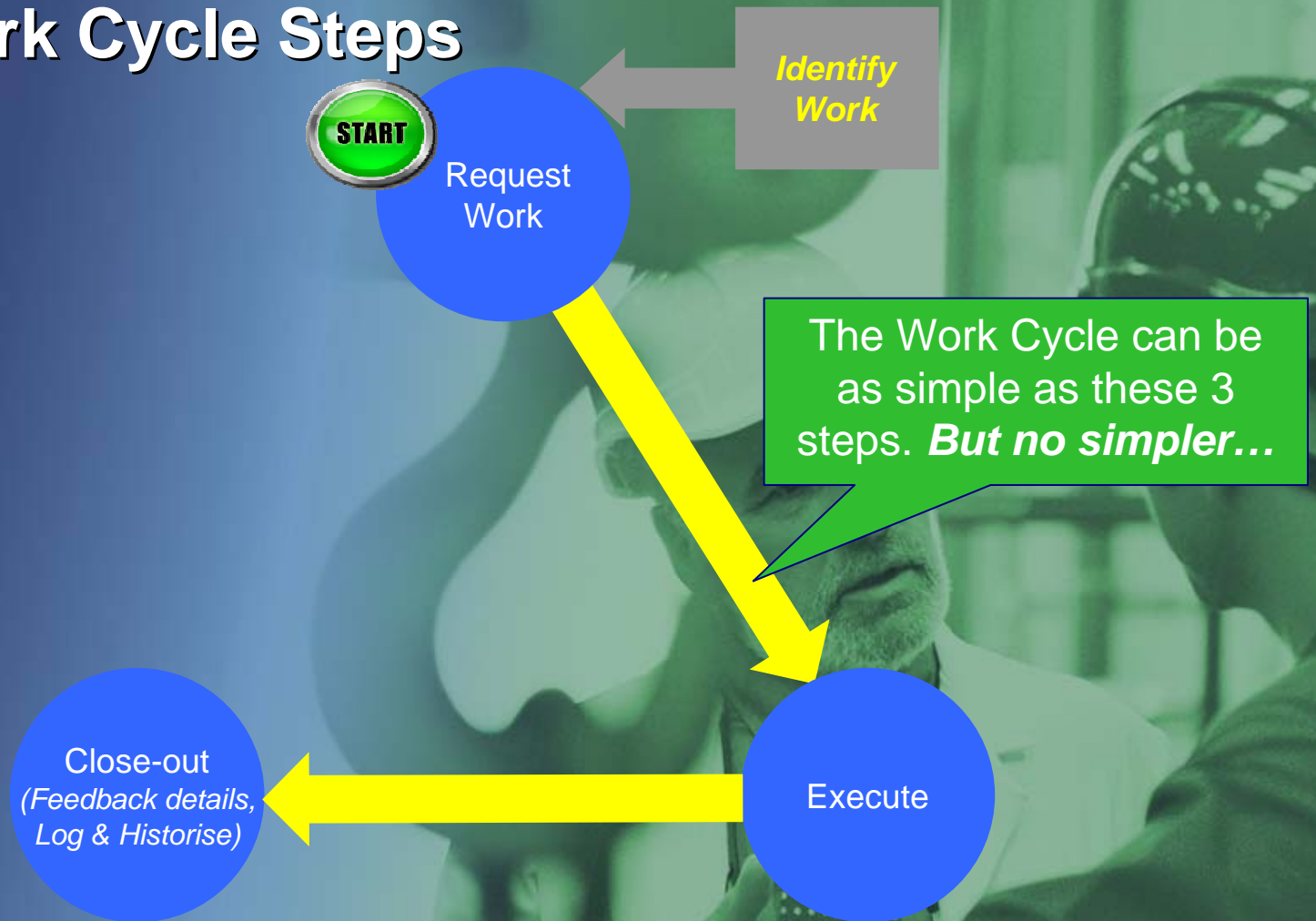
Codes,  
Standards and  
Regulations

So, the Work Management process is enabled by a **Work Order System** in which Work Requests and Work Orders from all sources – PPM, corrective, modifications, etc - pass through a systematic Work Cycle from initiation to completion and historising...

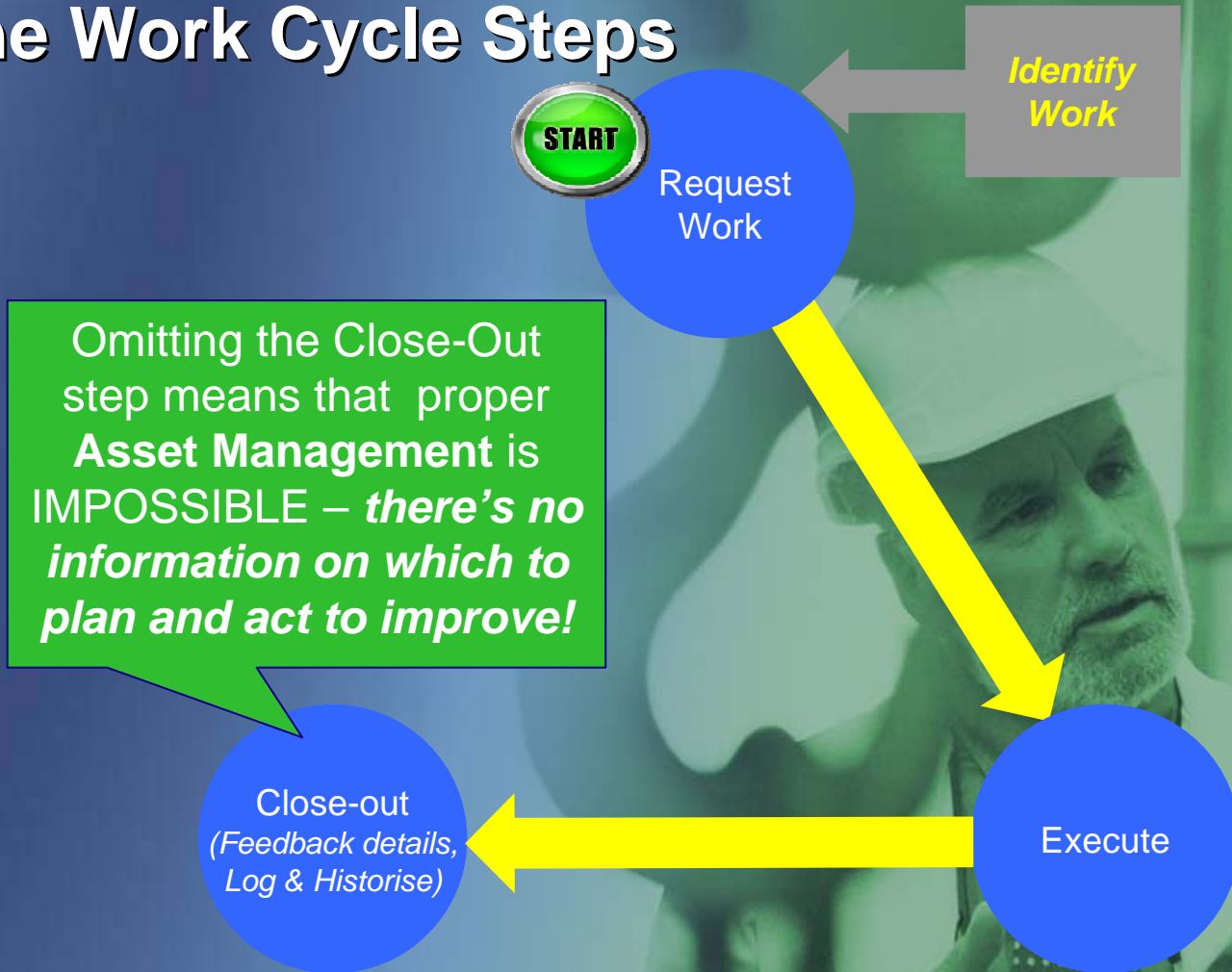


# The Work Cycle steps

# The Work Cycle Steps



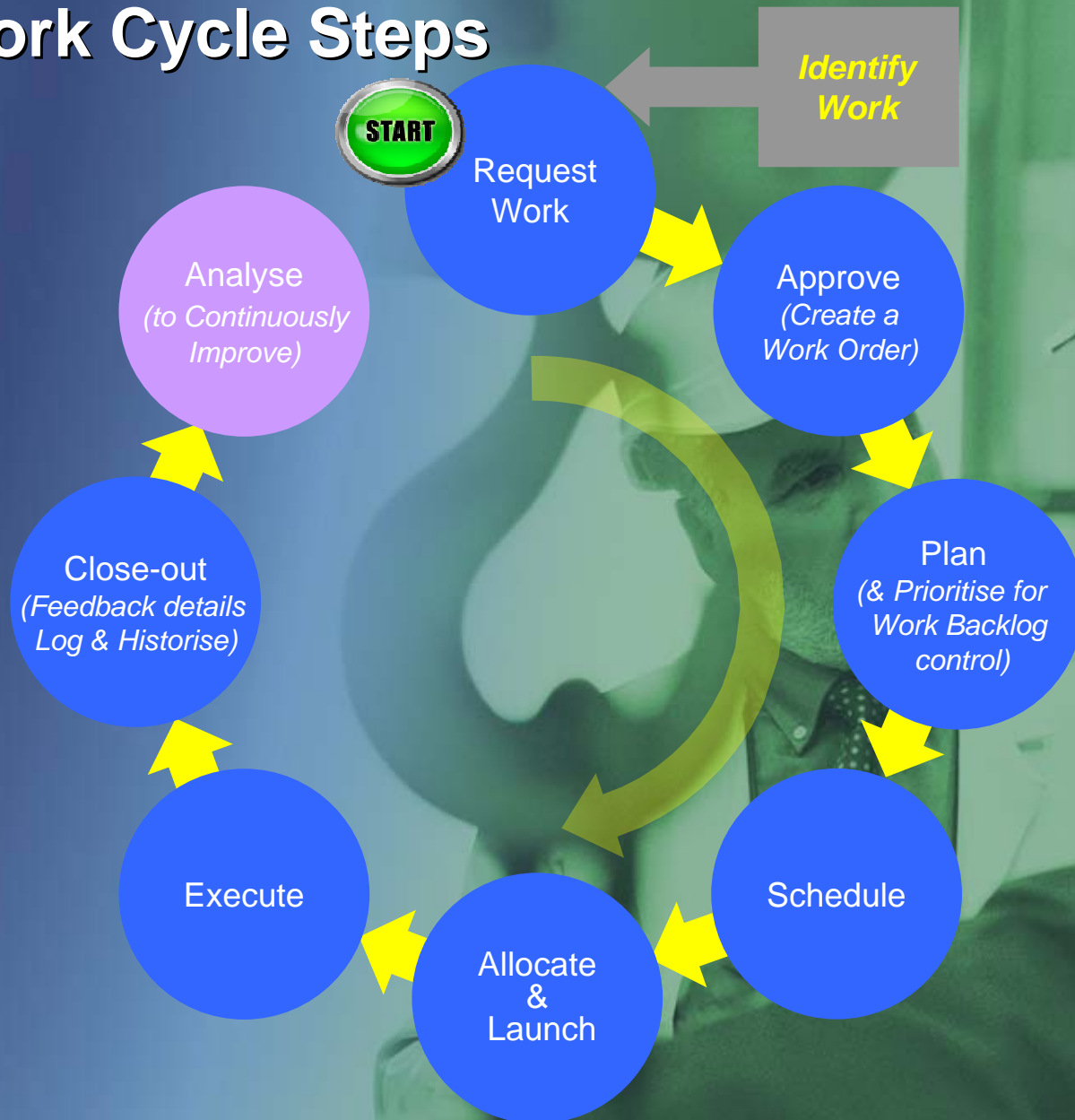
# The Work Cycle Steps



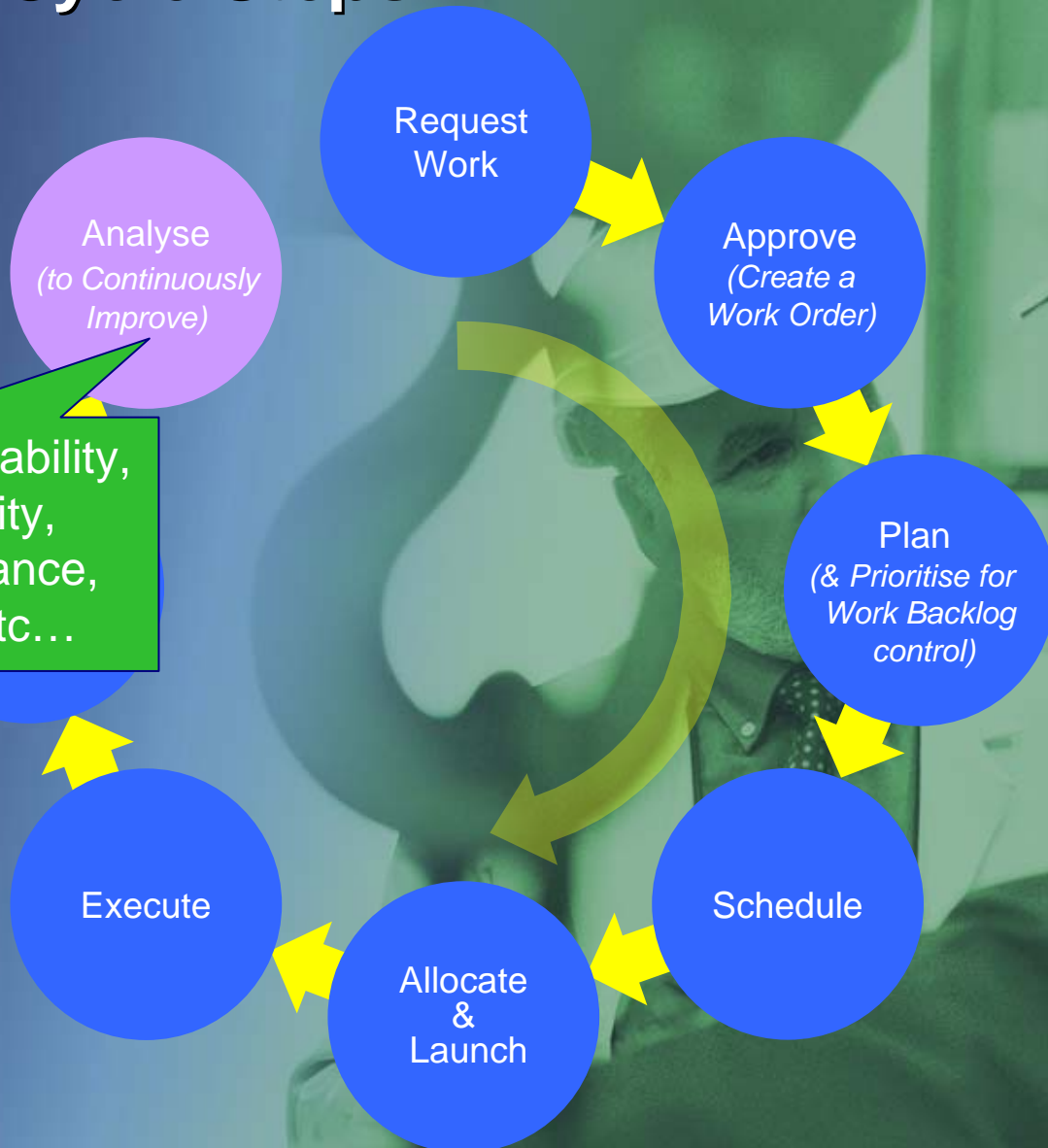
# The Work Cycle Steps



# The Work Cycle Steps



# The Work Cycle Steps

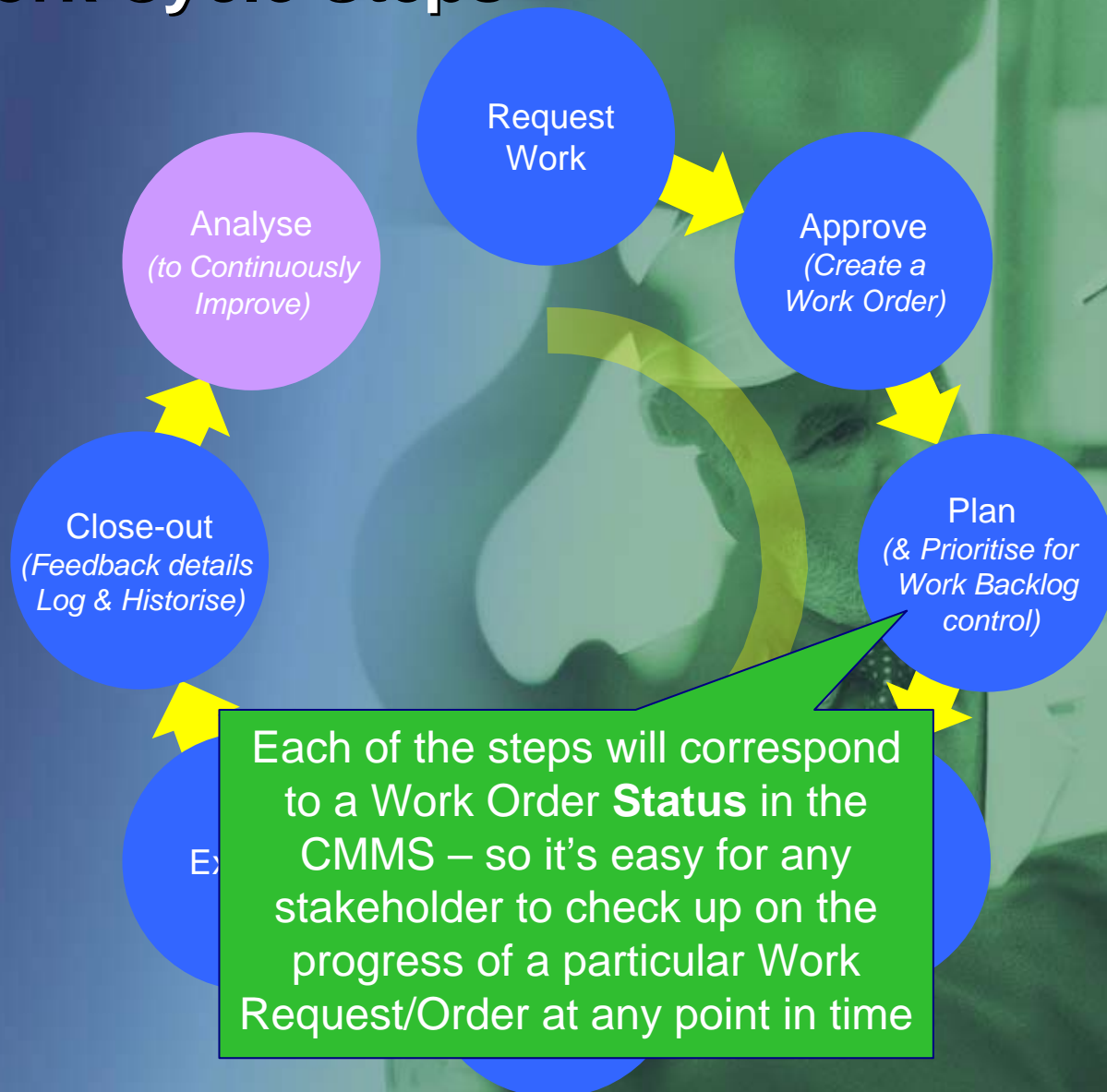


*Improve* - Asset reliability, process capability, regulatory compliance, work methods, etc...

# The Work Cycle Steps

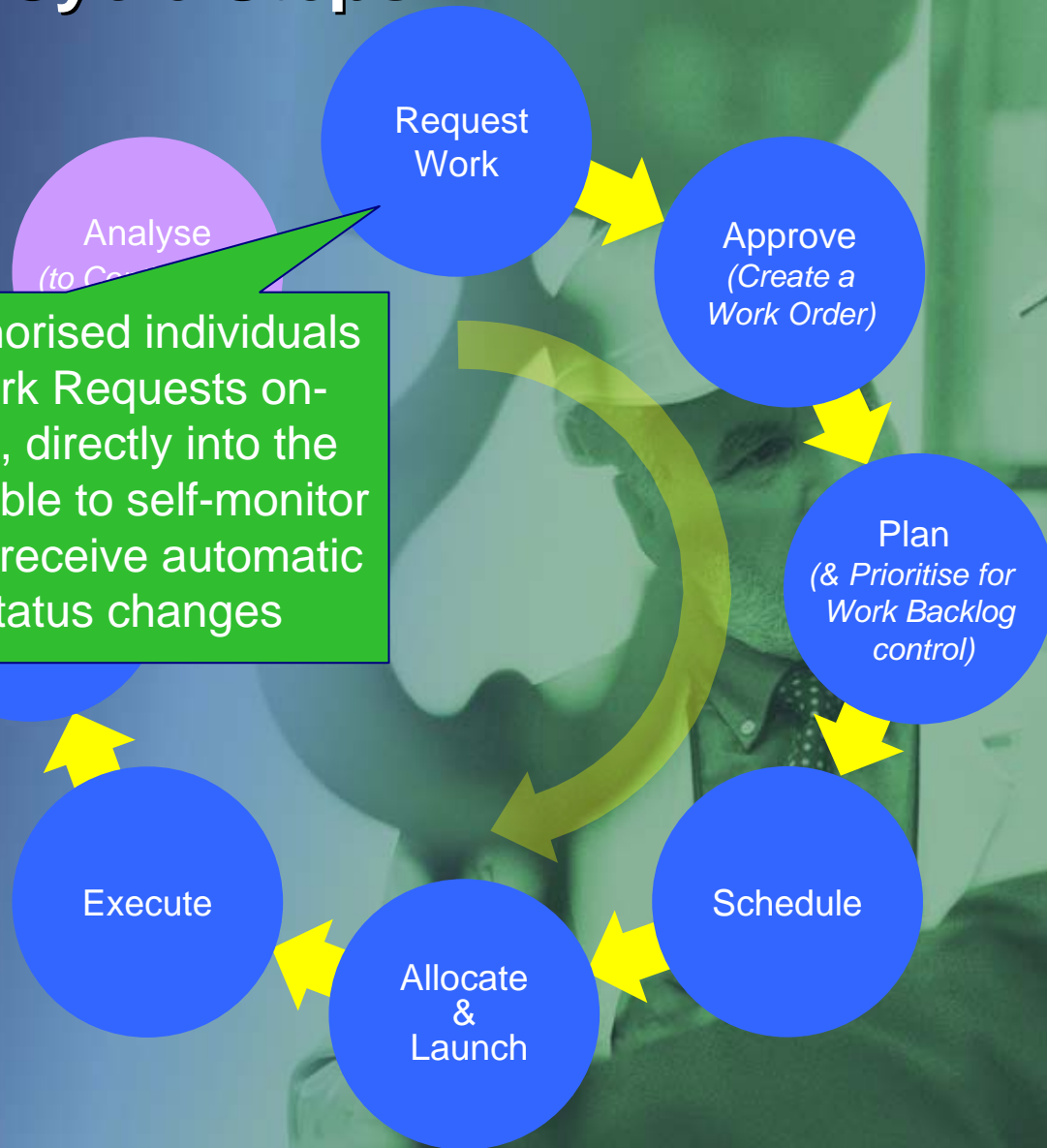


# The Work Cycle Steps

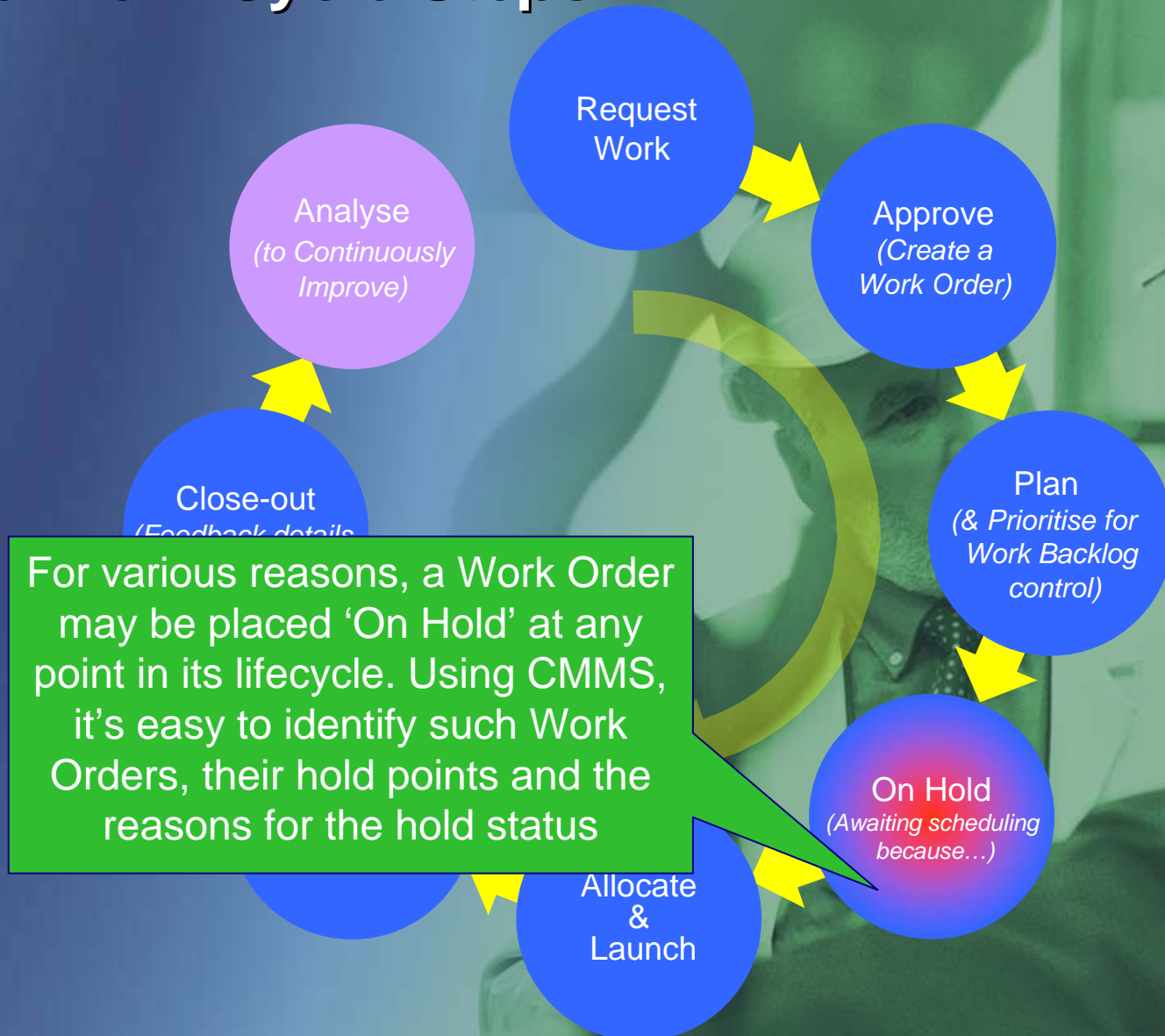


# The Work Cycle Steps

With CMMS, authorised individuals can register Work Requests on-line, or via email, directly into the system. They're able to self-monitor job progress and receive automatic updates on Status changes



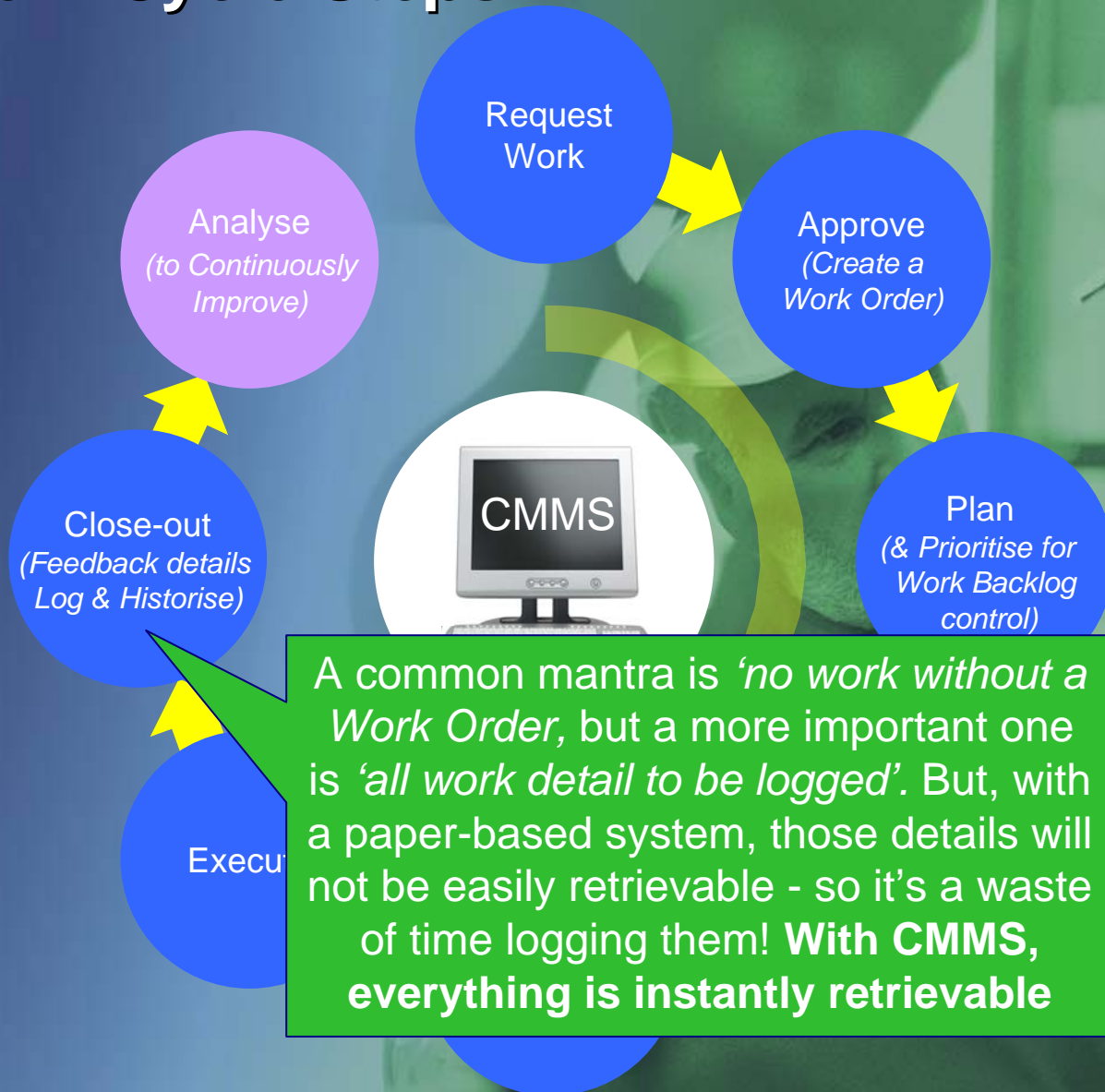
# The Work Cycle Steps



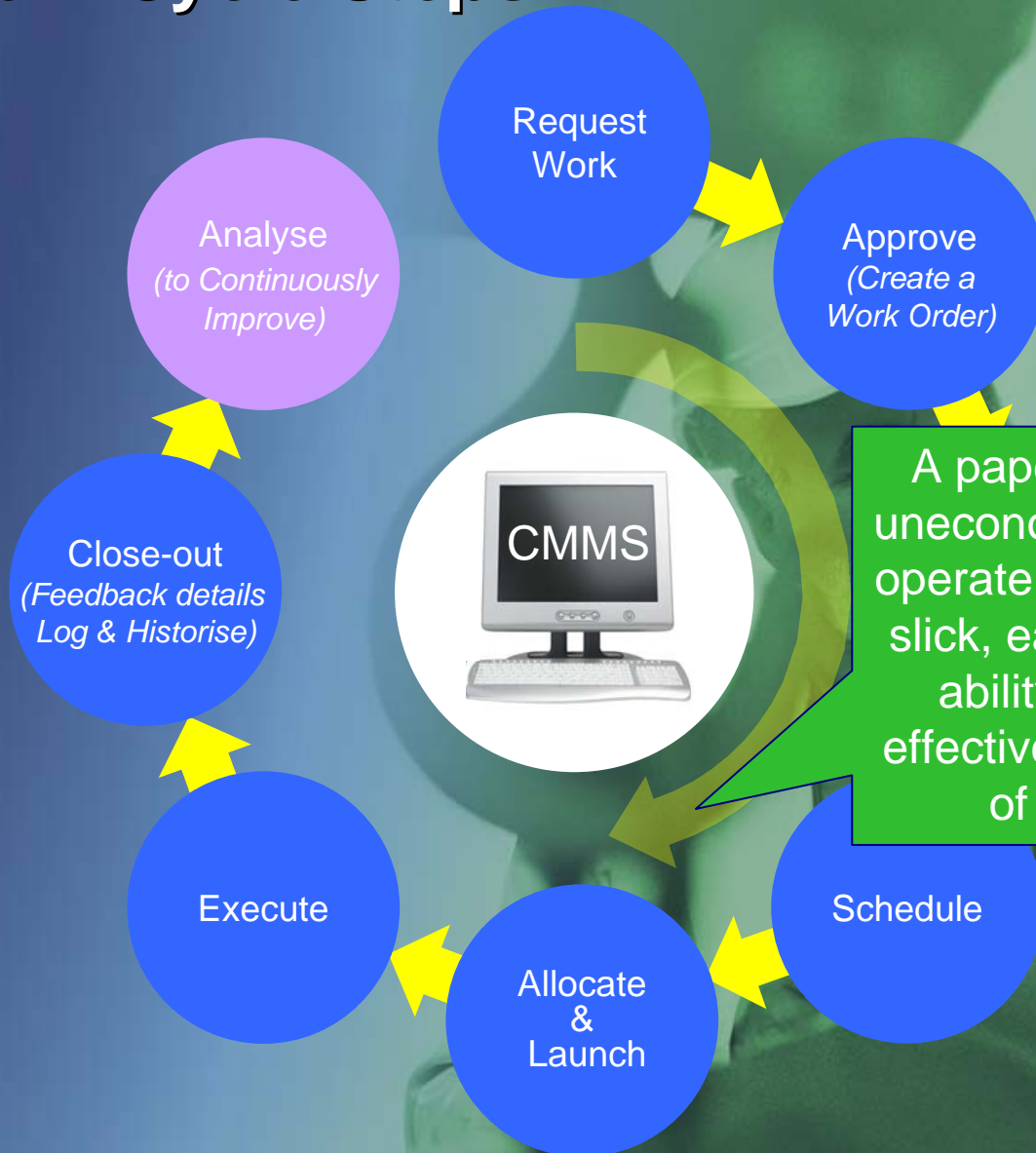
# The Work Cycle Steps



# The Work Cycle Steps



# The Work Cycle Steps



A paper-based system is uneconomical and clumsy to operate. Whereas, CMMS is slick, easy and delivers the ability to maximise the effectiveness and efficiency of the Work cycle



**CMMS provides total  
integration of all Asset  
information**

# The essential contribution of CMMS

## Business Objectives



Codes,  
Standards and  
Regulations

The CMMS is the repository of an organisation's **TOTAL** asset-related information. It provides the framework for a fully **INTEGRATED** technical and economic system. **ALL** Assets with information on their **ENTIRE** lifecycle - cradle to grave. The **COMPLETE** work history. **EVERYTHING** in one place

# The essential contribution of CMMS

## Business Objectives



Codes,  
Standards and  
Regulations

The CMMS is the repository of an organisation's **TOTAL** asset-related information. It provides the framework for a fully **INTEGRATED** technical and economic system. **ALL** Assets with information on their **ENTIRE** lifecycle - cradle to grave. The **COMPLETE** work history. **EVERYTHING** in one place



**Just a few clicks away!**

# The essential contribution of CMMS

## Business Objectives

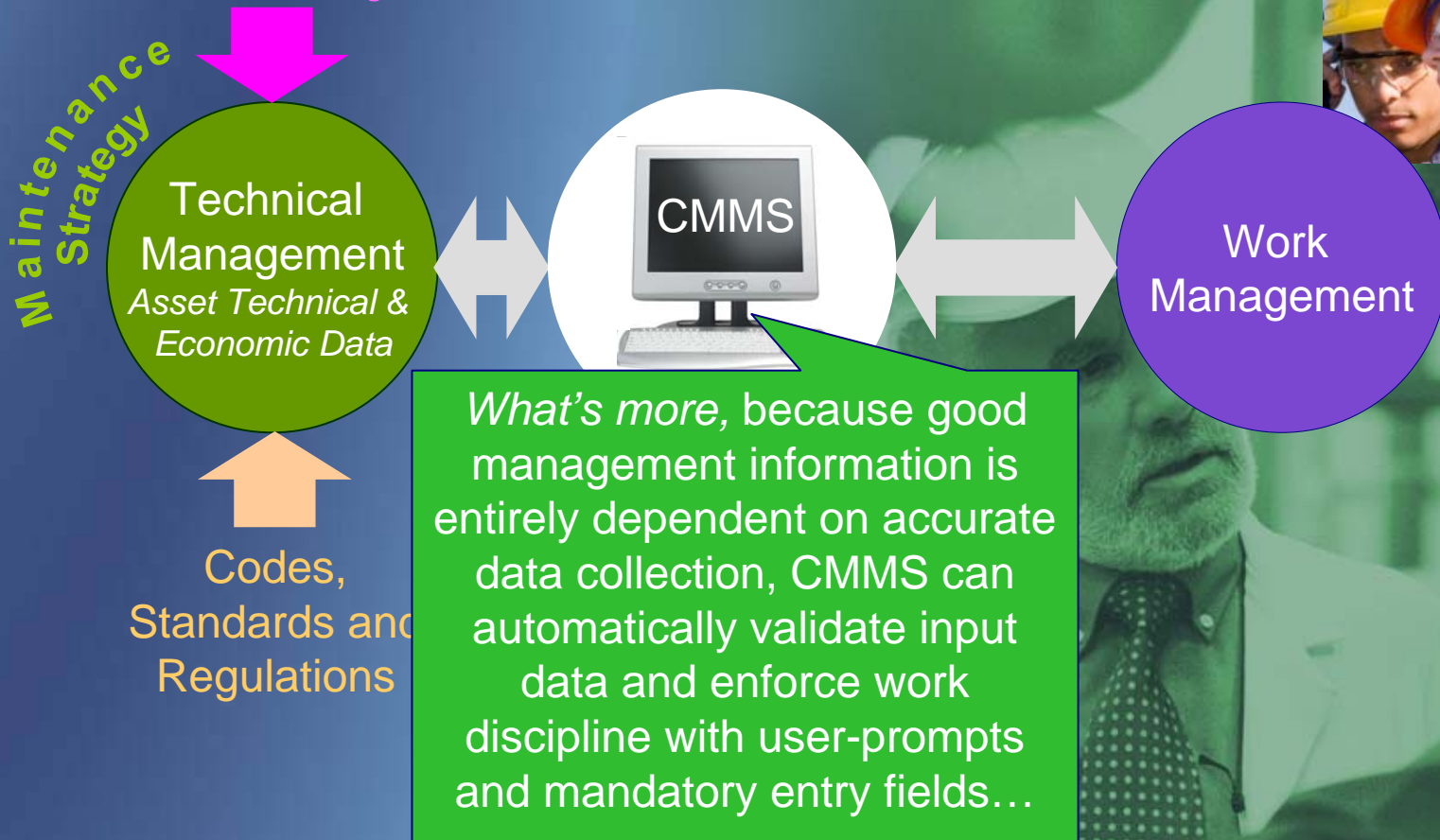


And, with a browser-based CMMS, any authorised person can access or add real-time information from **anywhere**, at any time - *including with a mobile phone...*



# The essential contribution of CMMS

## Business Objectives



# The essential contribution of CMMS

## Business Objectives



# The essential contribution of CMMS

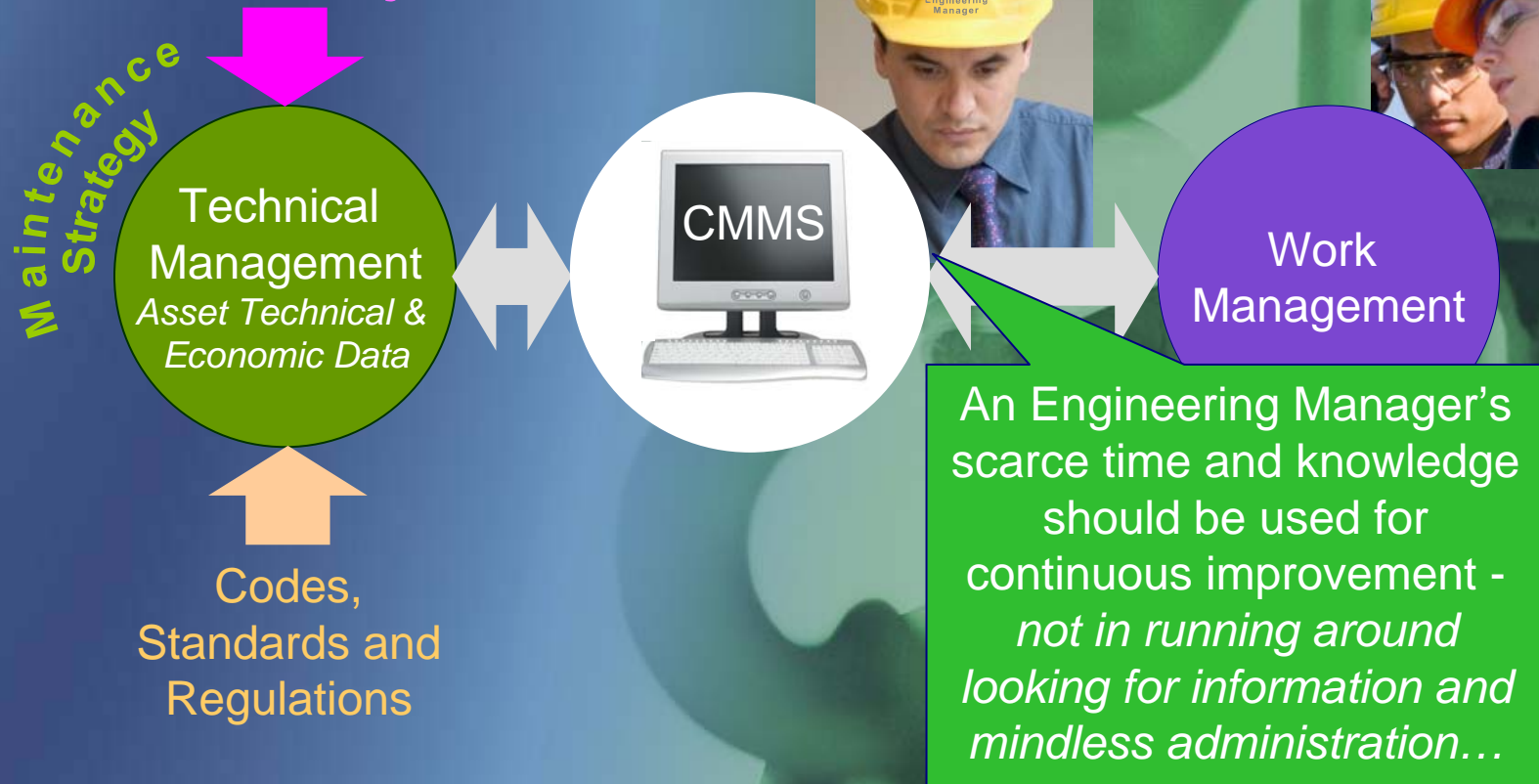
## Business Objectives



Engineering Managers in asset-intensive organisations simply can't fulfil their role and do their jobs properly without the aid of CMMS. The quantity of information they have to routinely process is just too enormous...

# The essential contribution of CMMS

## Business Objectives



# The essential contribution of CMMS

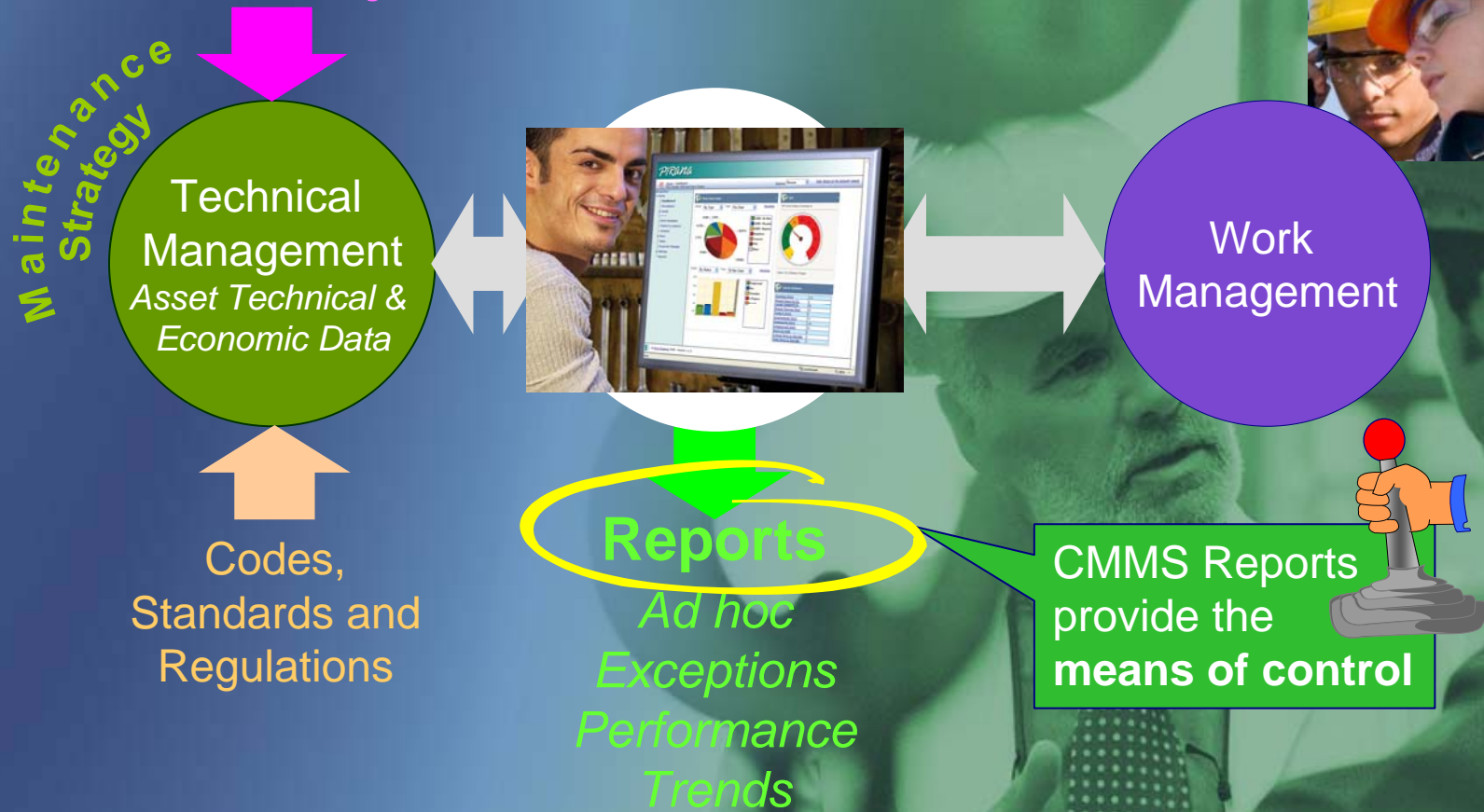
## Business Objectives



CMMS enables the transformation of organisational effectiveness and efficiency, freeing up management time to focus on value-adding engineering and procedural innovations. *And*, with CMMS, performance improvement initiatives are easy to track and report on to other stakeholders

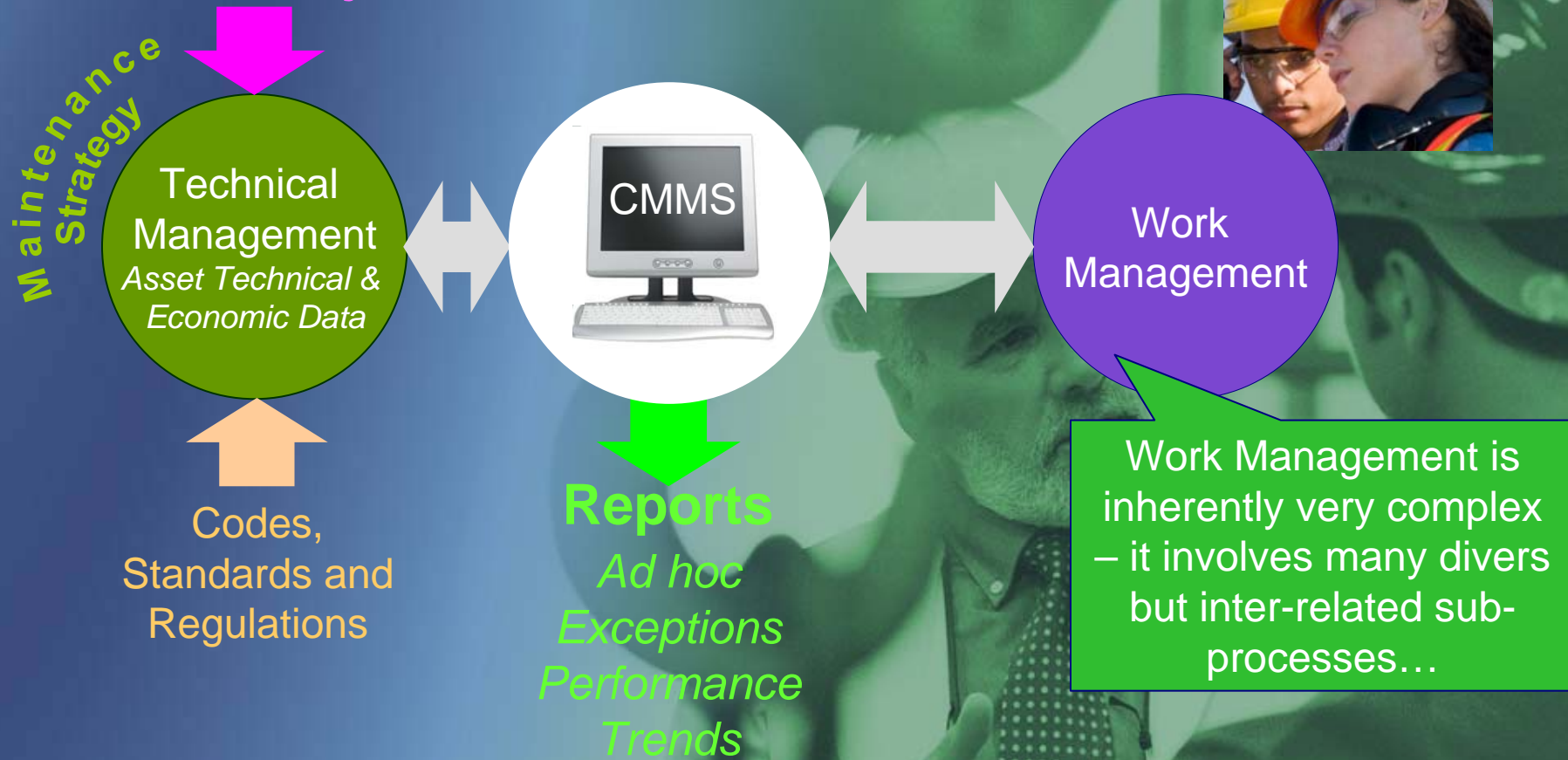
# The essential contribution of CMMS

## Business Objectives



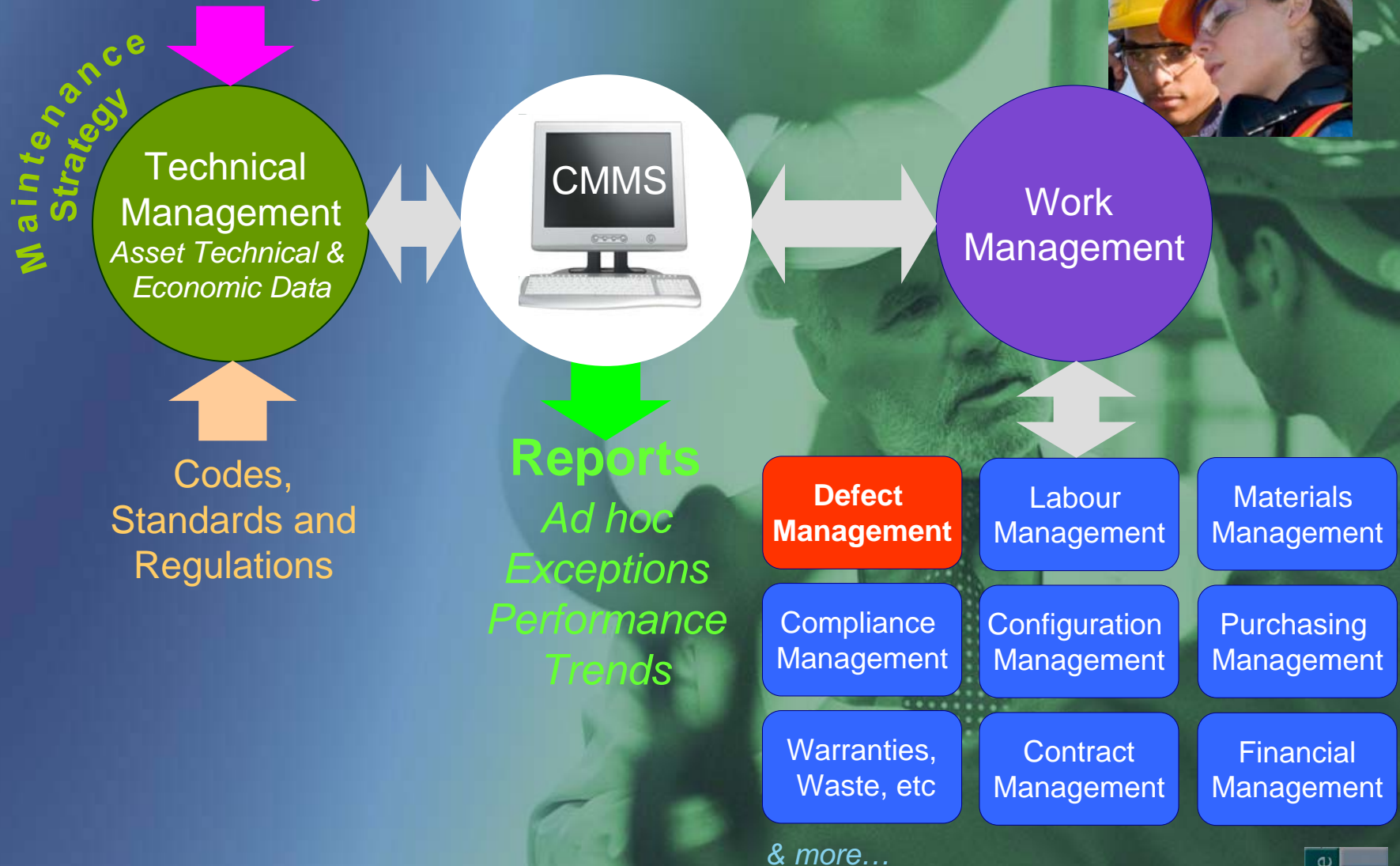
# The essential contribution of CMMS

## Business Objectives



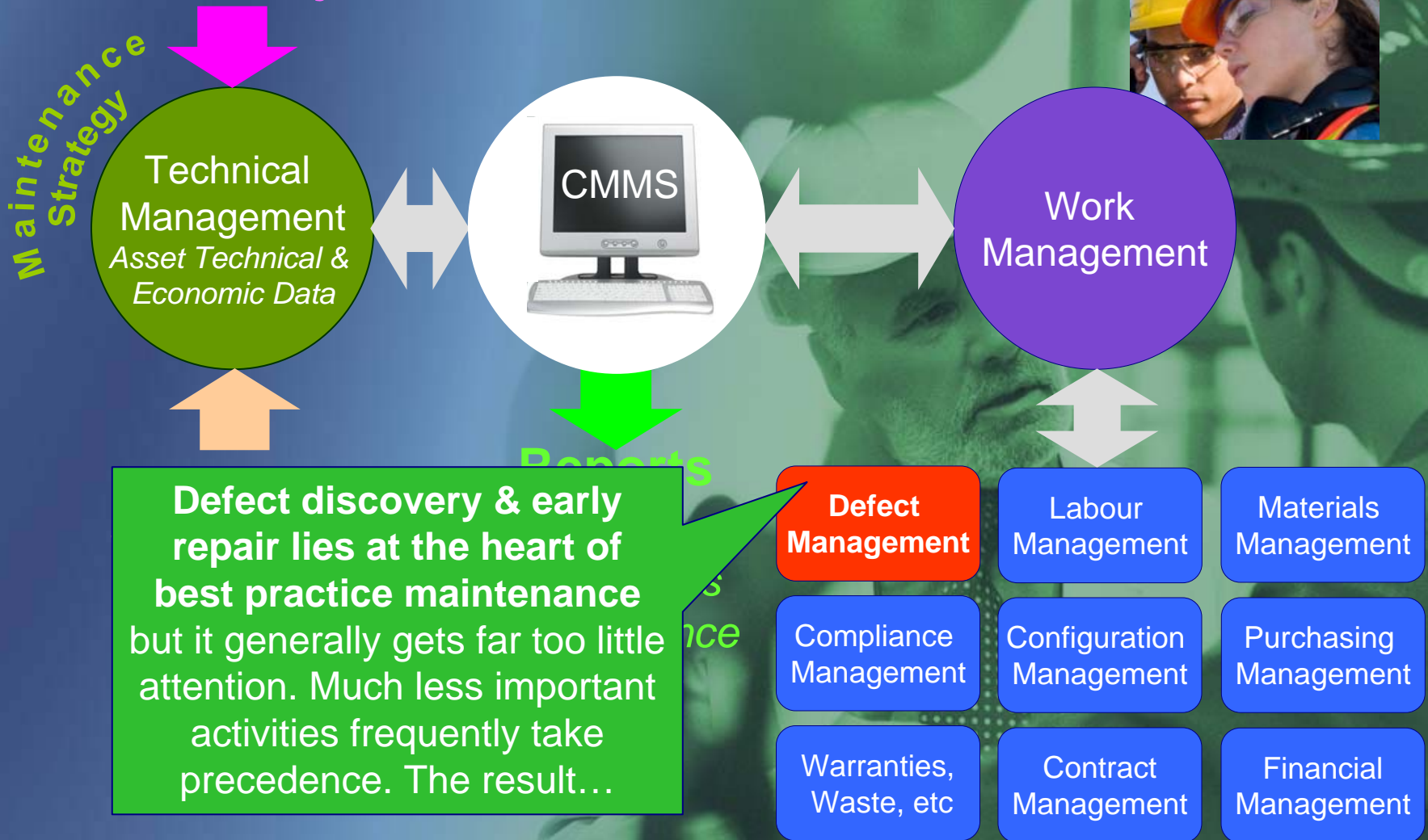
# The essential contribution of CMMS

## Business Objectives



# The essential contribution of CMMS

## Business Objectives



& more...

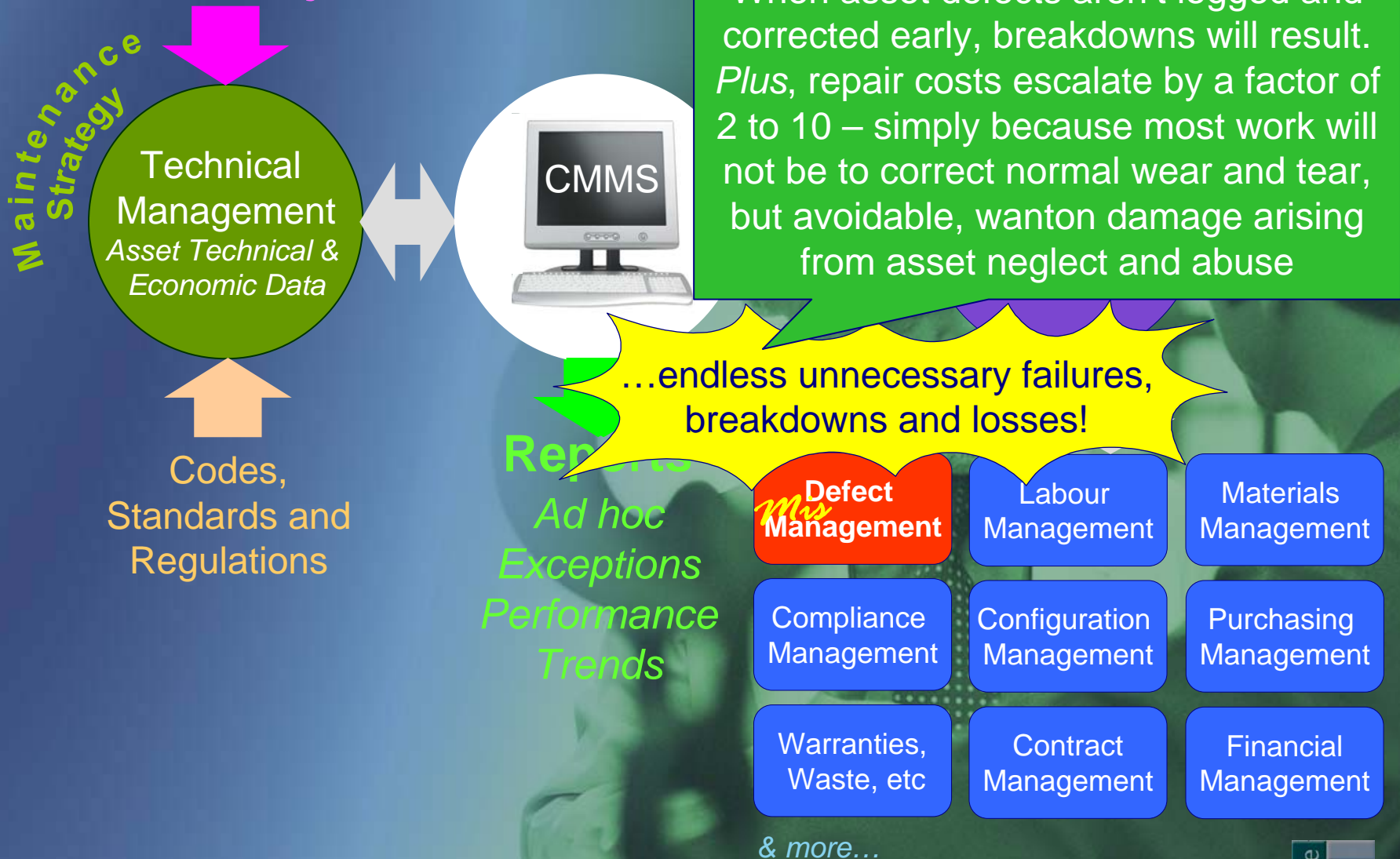
# The essential contribution of CMMS

## Business Objectives



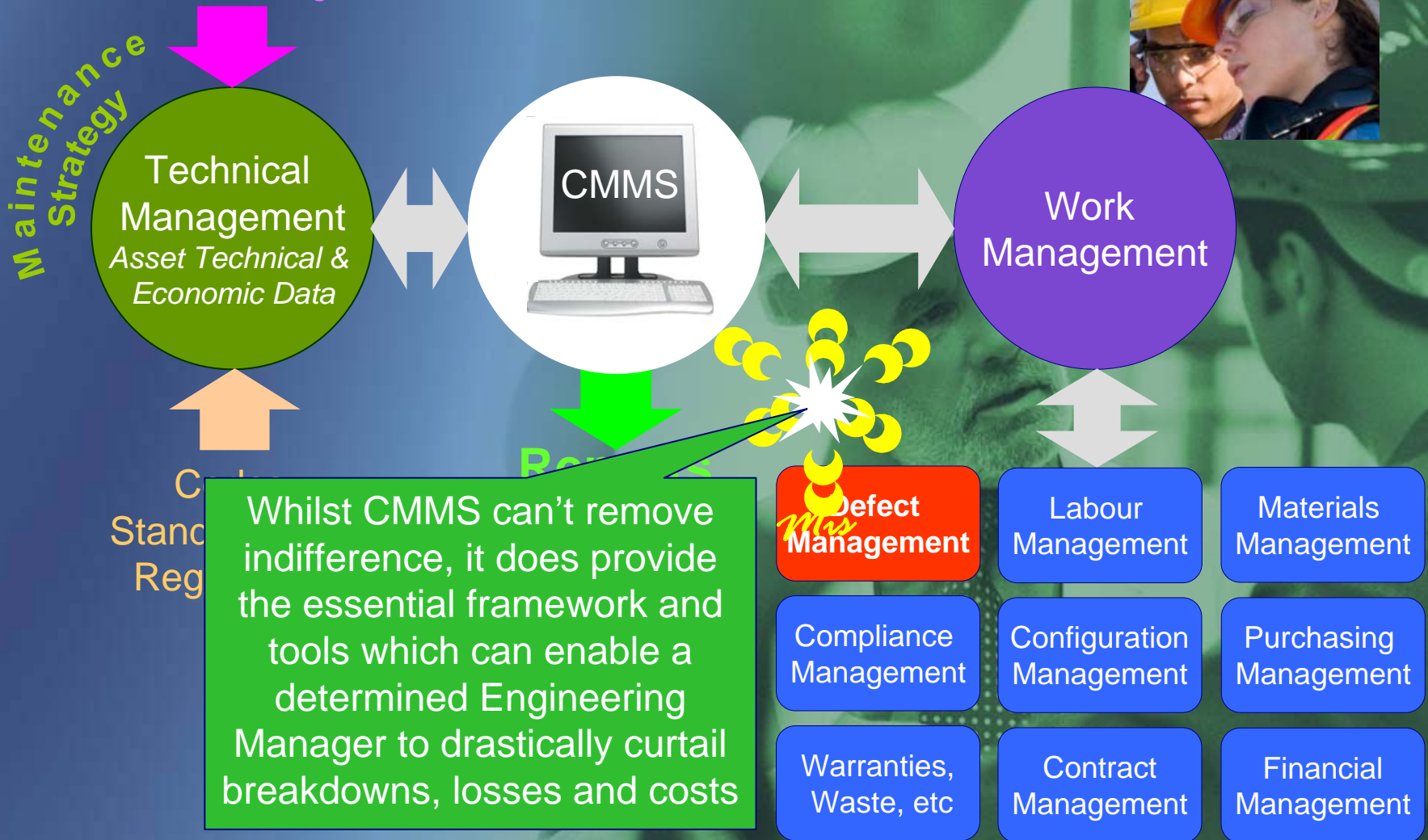
# The essential contribution of CMMS

## Business Objectives



# The essential contribution of CMMS

## Business Objectives



& more...



*Slicing and dicing Asset Management Data*

## **Workload**

*Categorising individual jobs...*

# Slicing & dicing - Workload

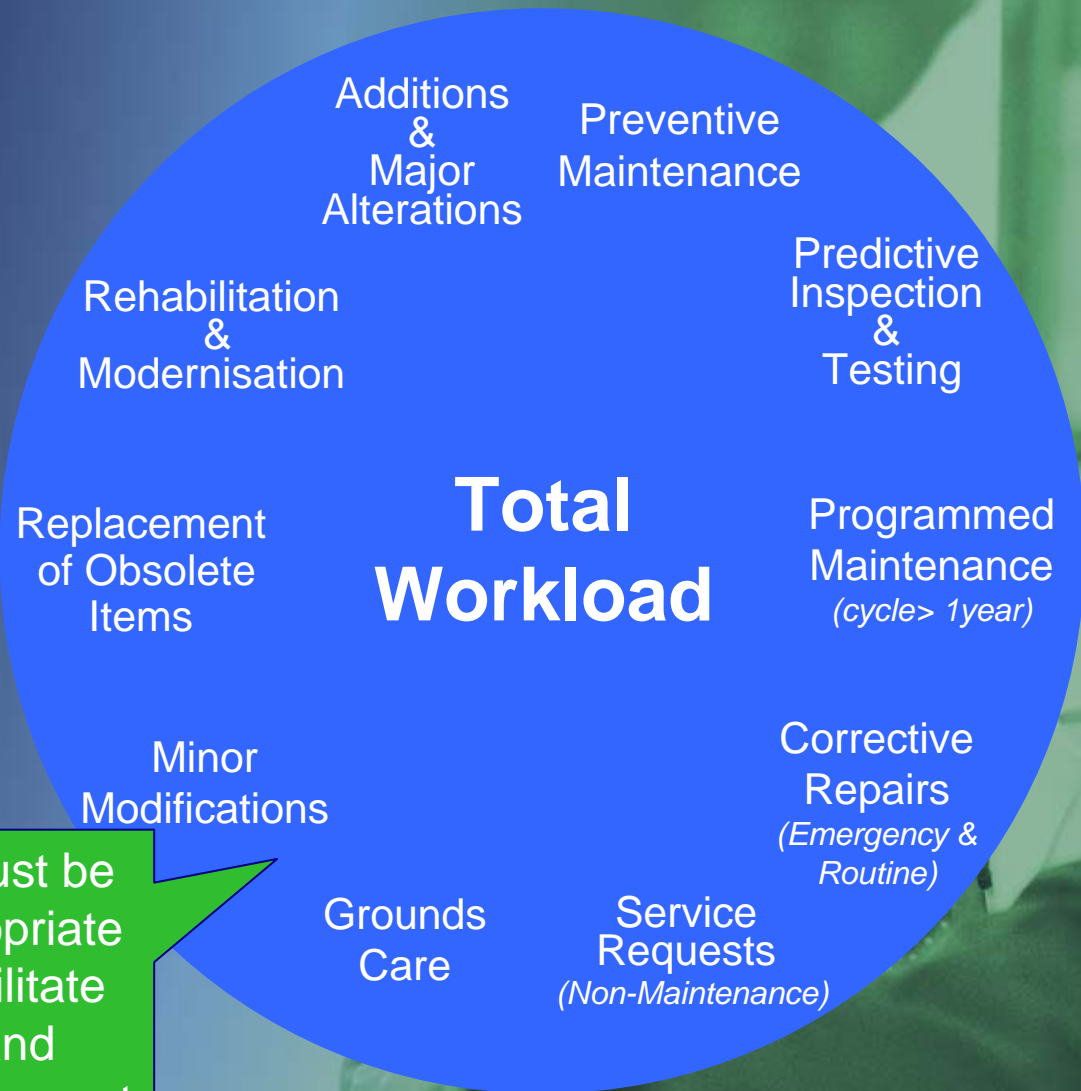
- To enable proper technical and economic management, the overall Asset-related Workload must be sub-divided into categories – *'divide and rule' is the rule*
- Use of multiple categories of work (Work Types) facilitates better planning and enables operational performance to be efficiently monitored, assessed, controlled and improved. Performance comparisons (using metrics and KPIs) can be more readily made between different Departments, Sites and Assets - and benchmark practices and performance standards deployed across the organisation
- To gain the most effective and efficient control of the Workload, CMMS is essential

# Slicing & dicing – Work categories

**Total  
Workload**

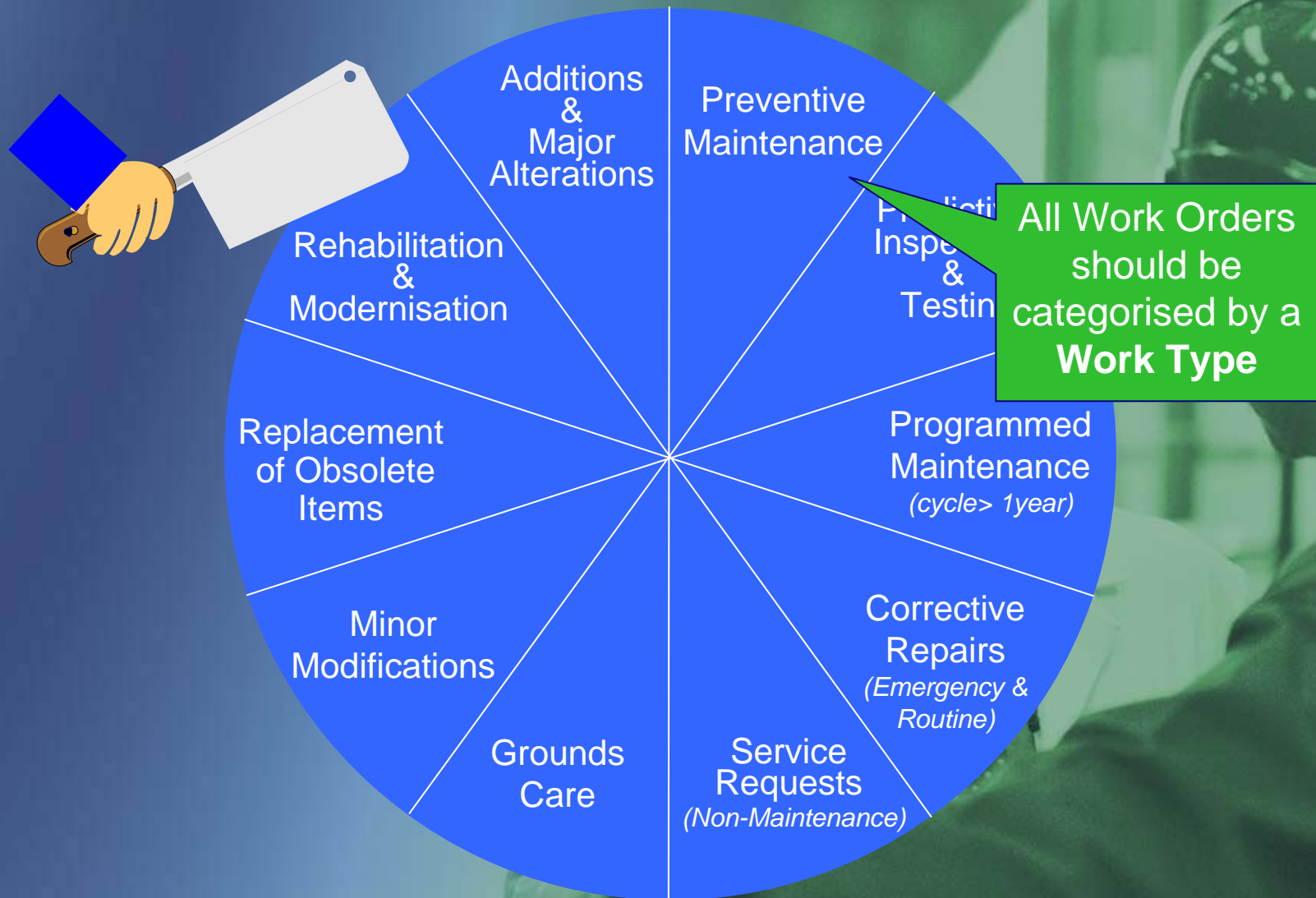


# Slicing & dicing – Work categories



The Workload must be divided into appropriate categories to facilitate its **technical** and **economic** management

# Slicing & dicing – Work categories

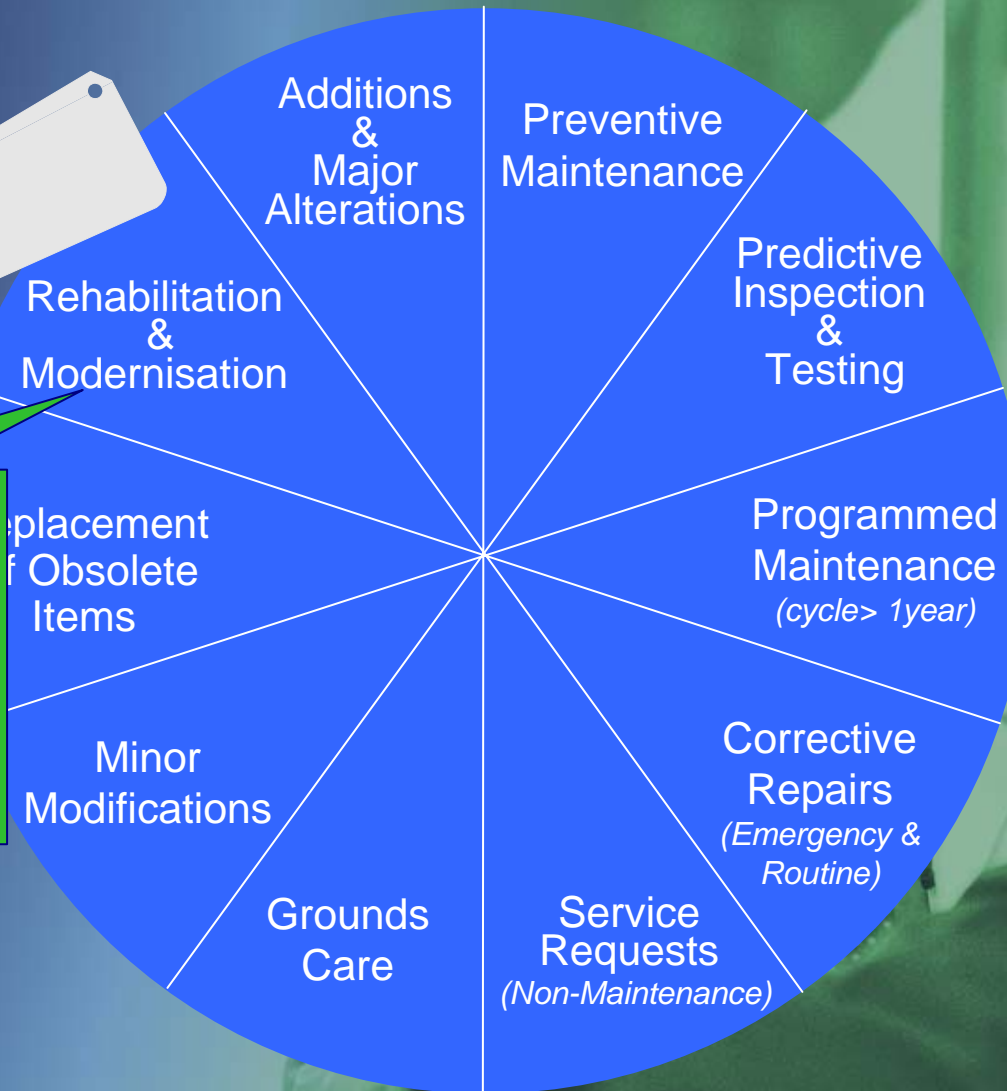


All Work Orders should be categorised by a **Work Type**

# Slicing & dicing – Work categories



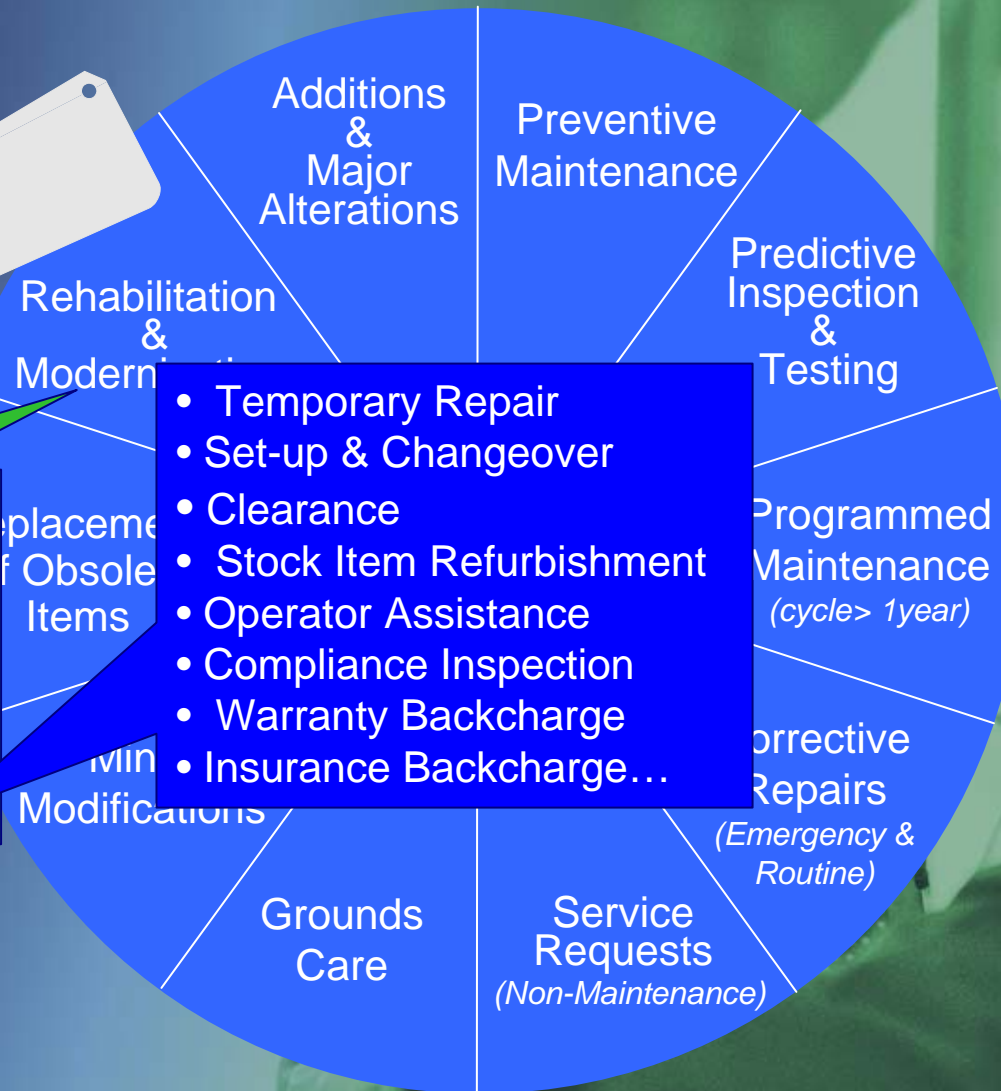
These are some common examples. According to your needs, there can be fewer or more Work Types...



# Slicing & dicing – Work categories



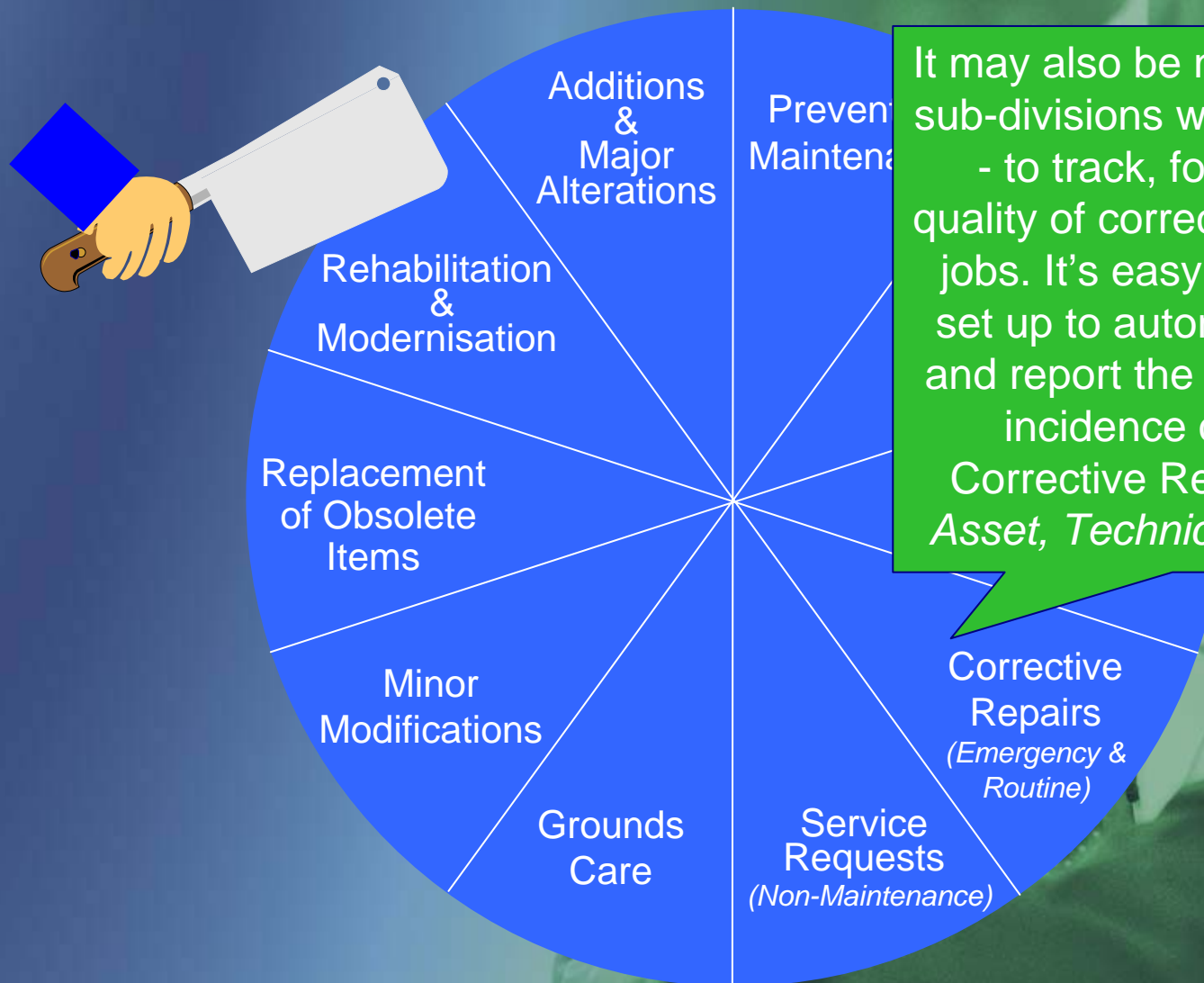
These are some common examples. According to your needs, there can be fewer or more Work Types...



# Slicing & dicing – Work categories

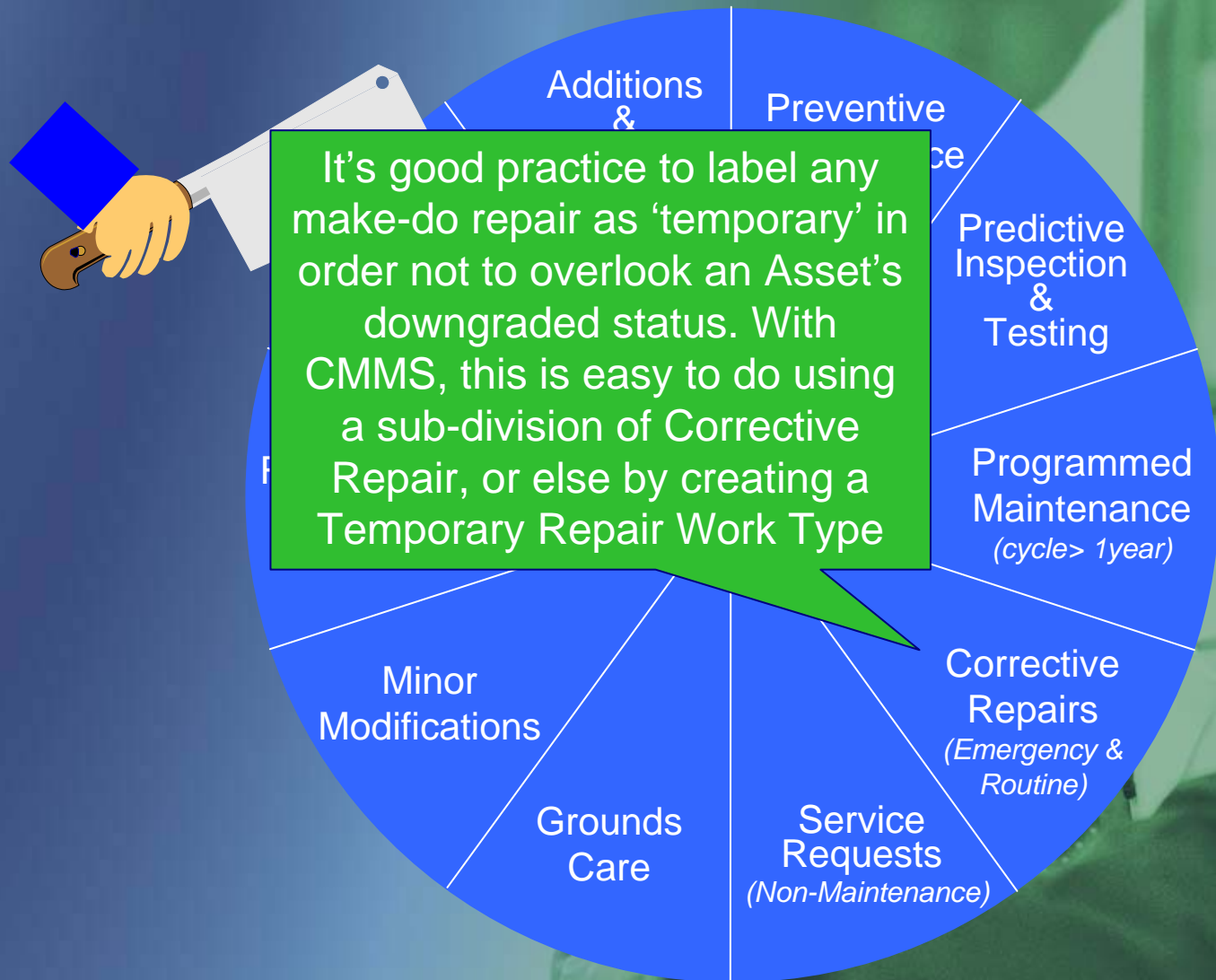


# Slicing & dicing – Work categories



It may also be necessary to have sub-divisions within a Work Type - to track, for example, the quality of corrective maintenance jobs. It's easy for CMMS to be set up to automatically monitor and report the First-Fix rate and incidence of Rework on Corrective Repairs - *by Area, Asset, Technician, Team, etc...*

# Slicing & dicing – Work categories

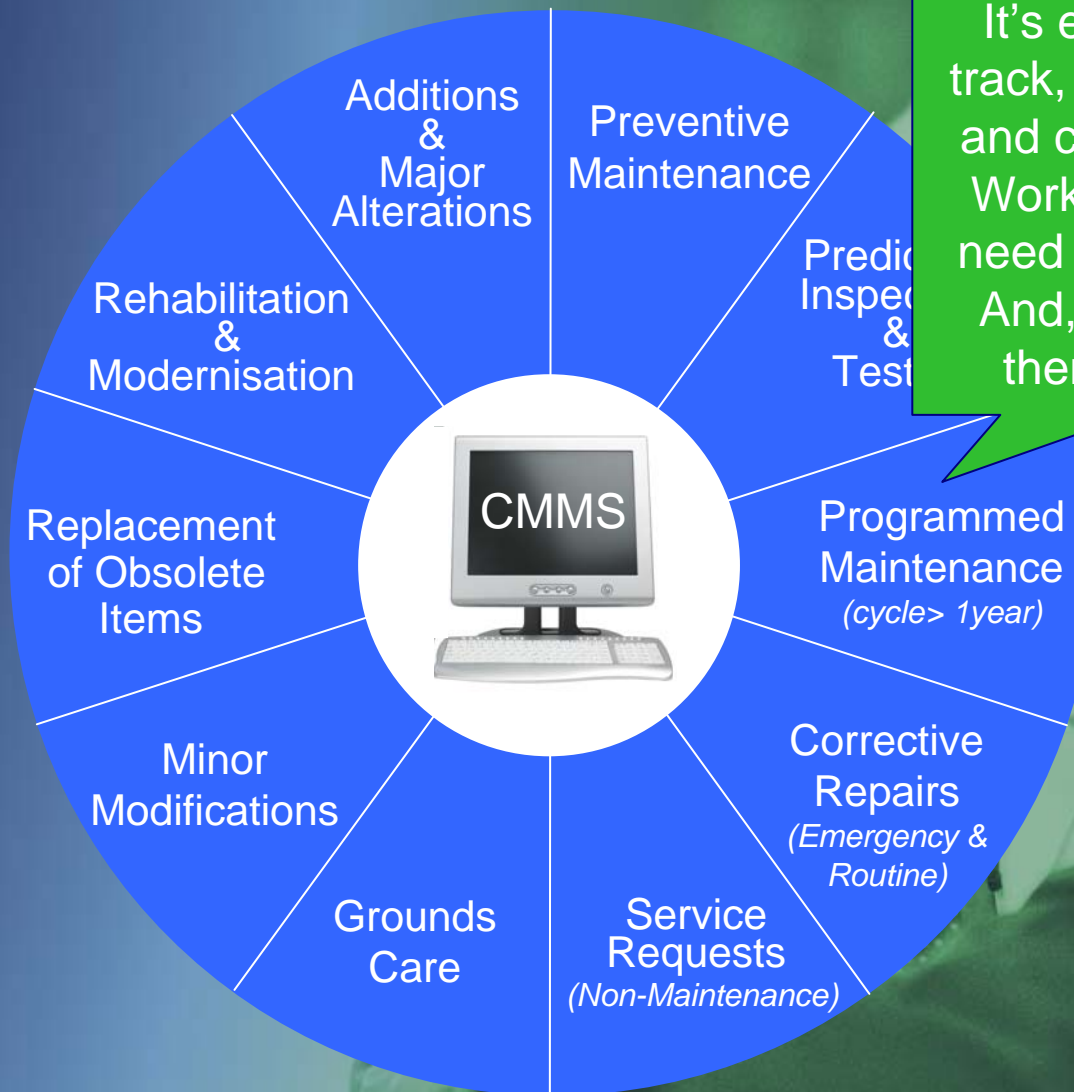


# Slicing & dicing – Work categories



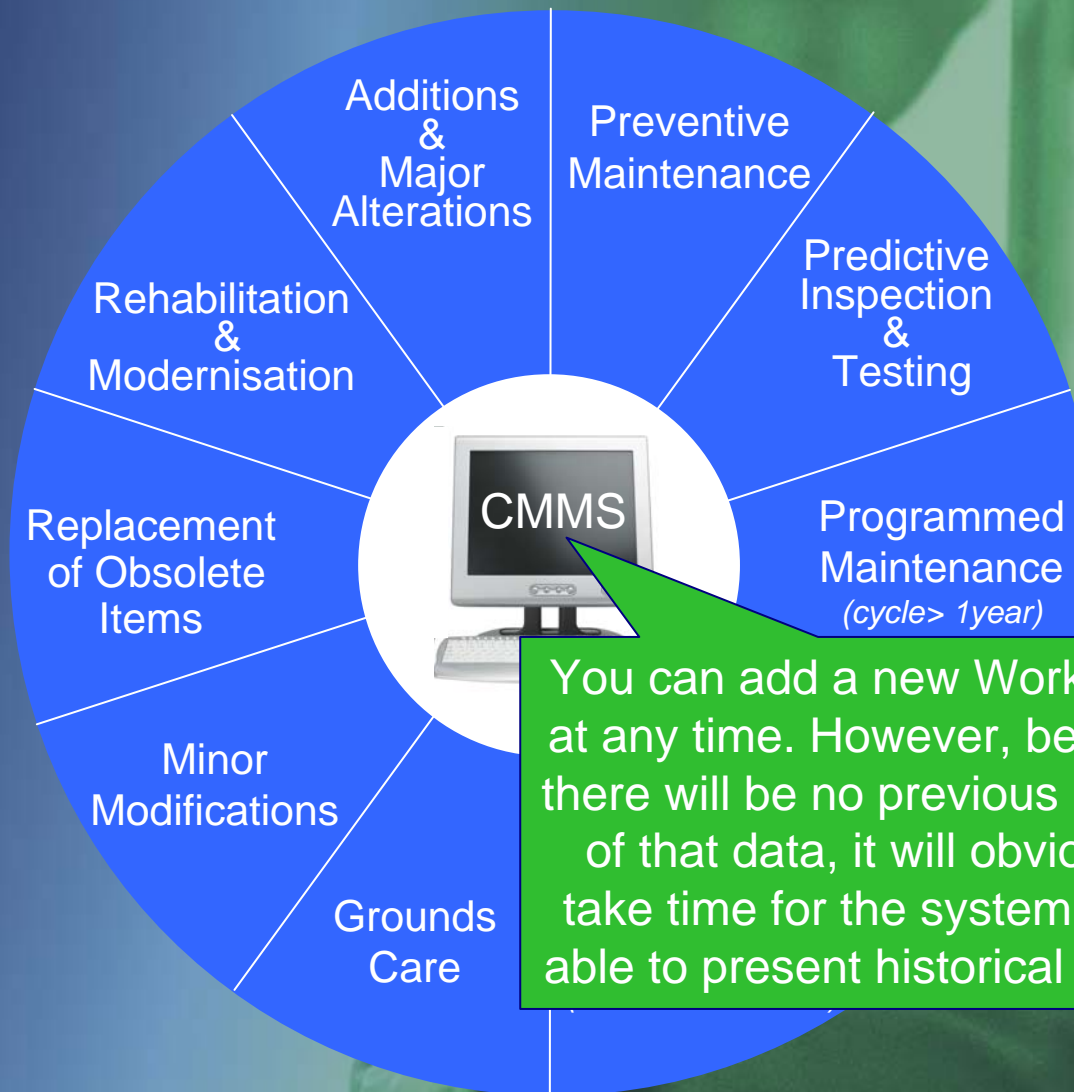
The Work Type descriptors may vary from organisation to organisation, but the basic nature of the work itself always remains the same

# Slicing & dicing – Work categories



It's easy to set up, track, correlate, trend and control as many Work Types as you need in your CMMS. And, you can label them as you like

# Slicing & dicing – Work categories



You can add a new Work Type at any time. However, because there will be no previous history of that data, it will obviously take time for the system to be able to present historical trends

# Slicing & dicing – Work categories



**Keep It Simple Stupid**

# Slicing & dicing – Work categories





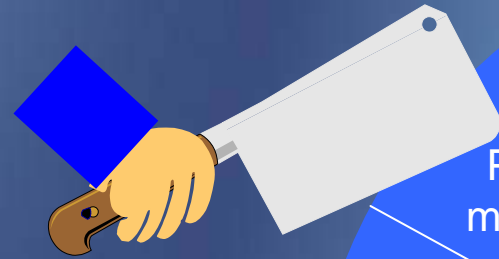
*Slicing and dicing Asset Management Data*

**Materials**

# Slicing & dicing – Material Categories



# Slicing & dicing – Material Categories



Total material acquisitions, movements and inventories (*Stores Stock*) must be divided up to facilitate proper **technical** and **economic** management

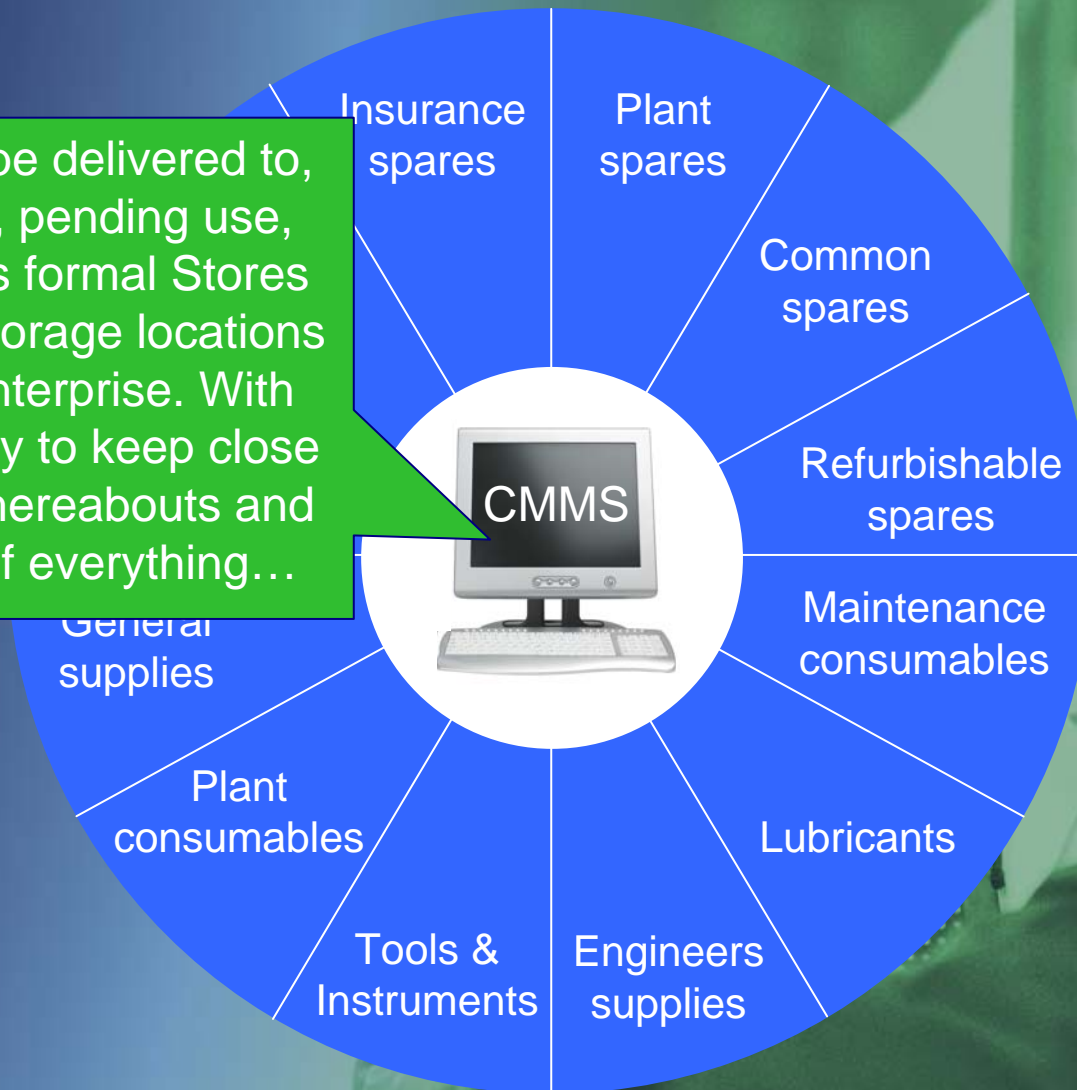
# Slicing & dicing – Material Categories



According to your needs, there can be other Material Types

# Slicing & dicing – Material Categories

Materials will be delivered to, received and, pending use, kept in various formal Stores and informal storage locations around the enterprise. With CMMS it's easy to keep close track of the whereabouts and movements of everything...



# Slicing & dicing – Material Categories




It's easy to set up, track and control multiple Material Types, movement categories and storage locations in your CMMS...

# Slicing & dicing – Material Categories

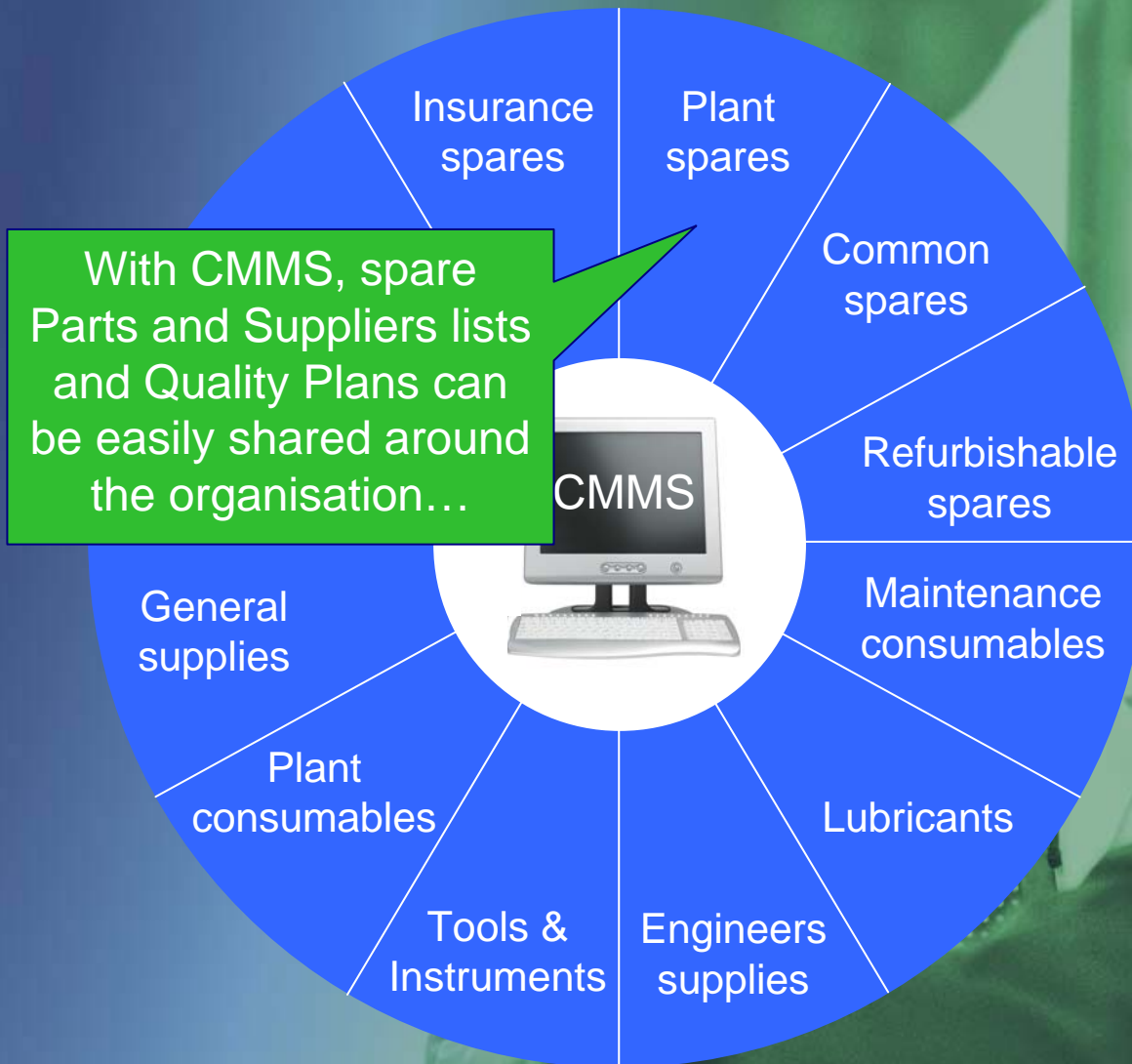


# Slicing & dicing – Material Categories



**Control and optimisation of stores value** (Working Capital) requires targets to be set and values monitored for stock holding with different 'movement' characteristics - **fast moving** ( $\ll 1$  year), **slow moving** ( $> 1$  year), **insurance** and **surplus materials**. CMMS makes it easy to have this precise level of control

# Slicing & dicing – Material Categories



# Slicing & dicing – Material Categories

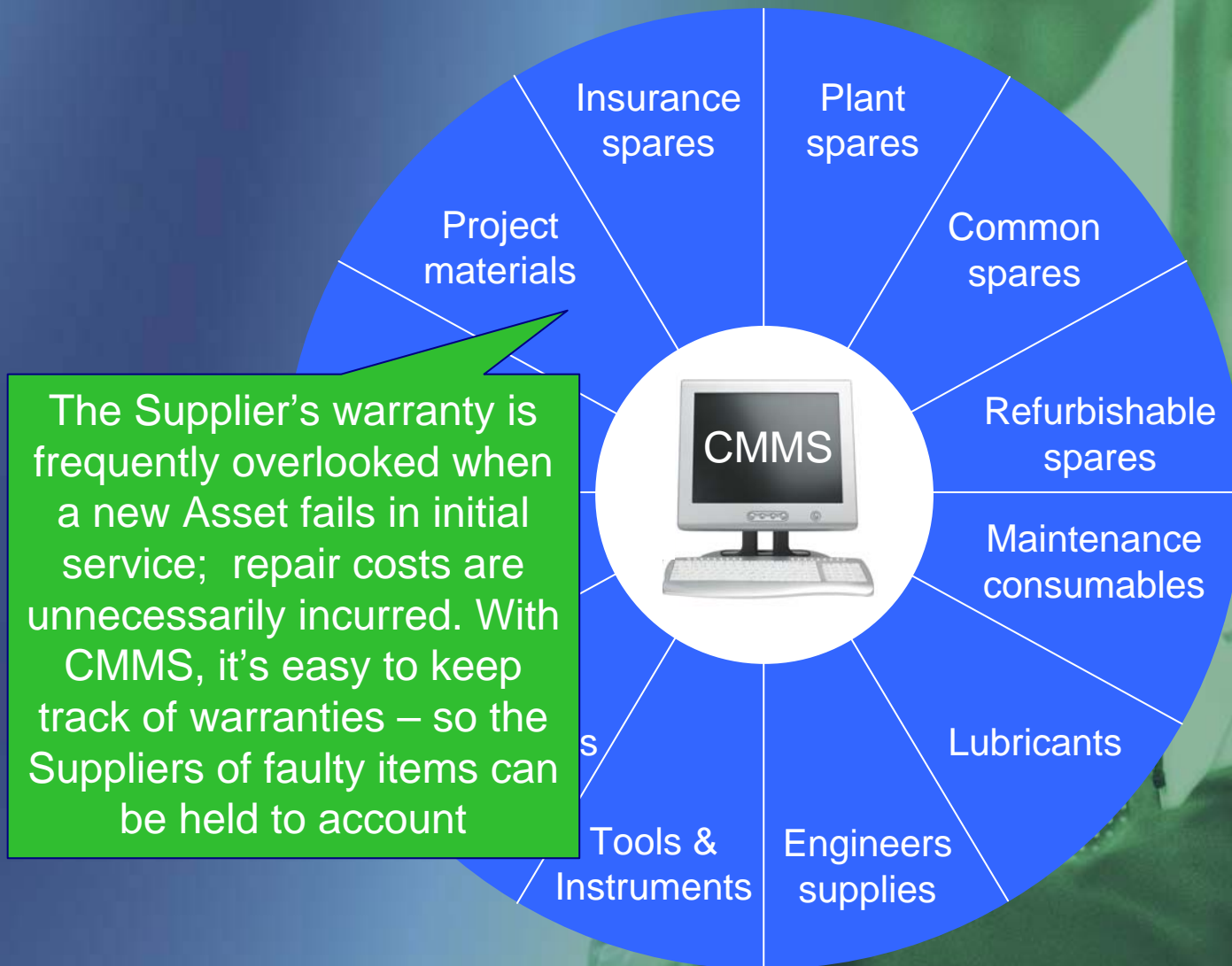


...it's easy to implement a spare Parts standardisation policy – both on-site and enterprise-wide. This reduces Working Capital tied up in stock – and also business risk

# Slicing & dicing – Material Categories



# Slicing & dicing – Material Categories



The Supplier's warranty is frequently overlooked when a new Asset fails in initial service; repair costs are unnecessarily incurred. With CMMS, it's easy to keep track of warranties – so the Suppliers of faulty items can be held to account

*Slicing and dicing Asset Management Data*

## **Asset Indenture**

*The geographical and assembly hierarchy...*

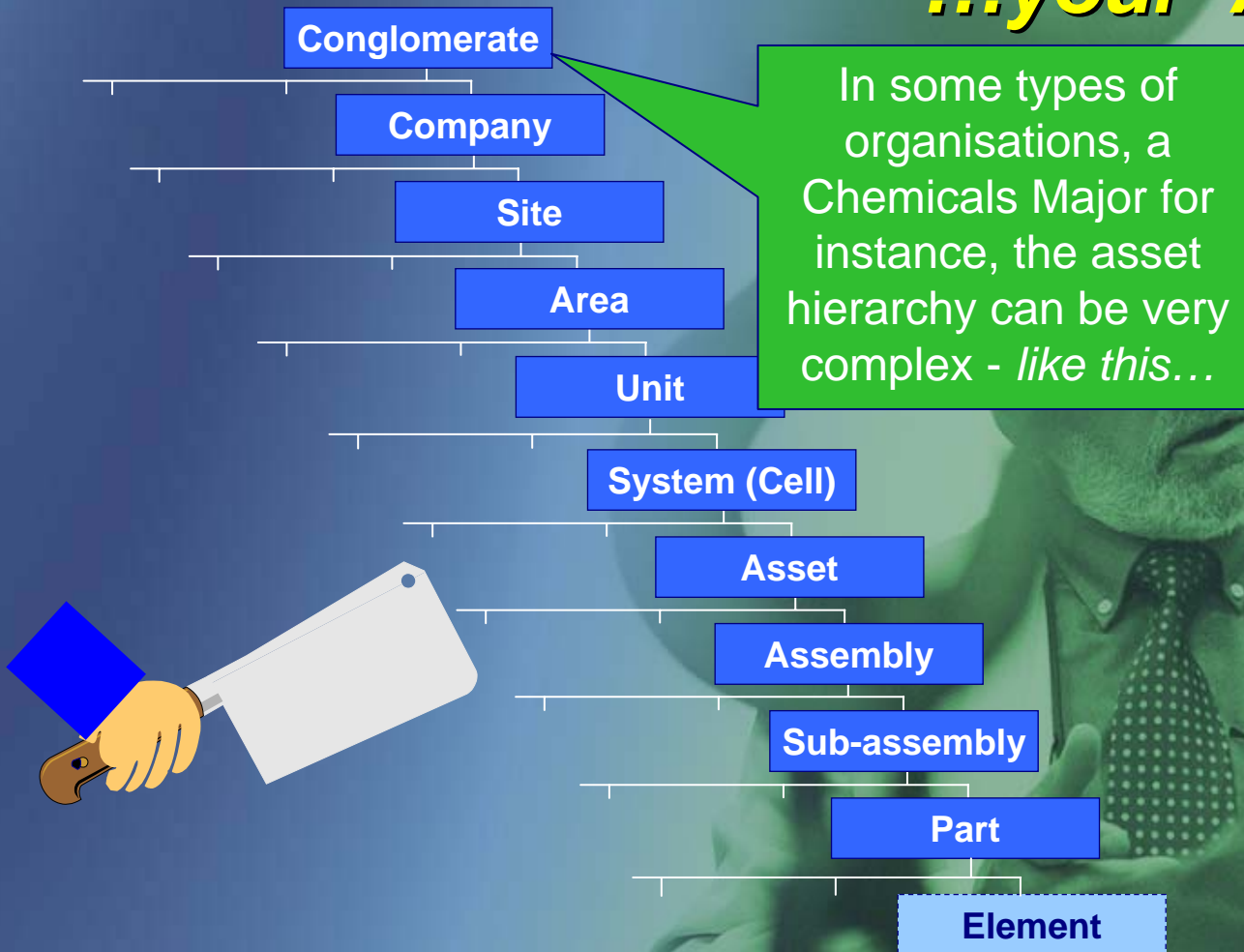
# Slicing & dicing - Asset Indenture Levels

## *...your 'Asset Tree'*

The asset hierarchy from the very top of the organisation to the lowest maintenance-demanding Parts

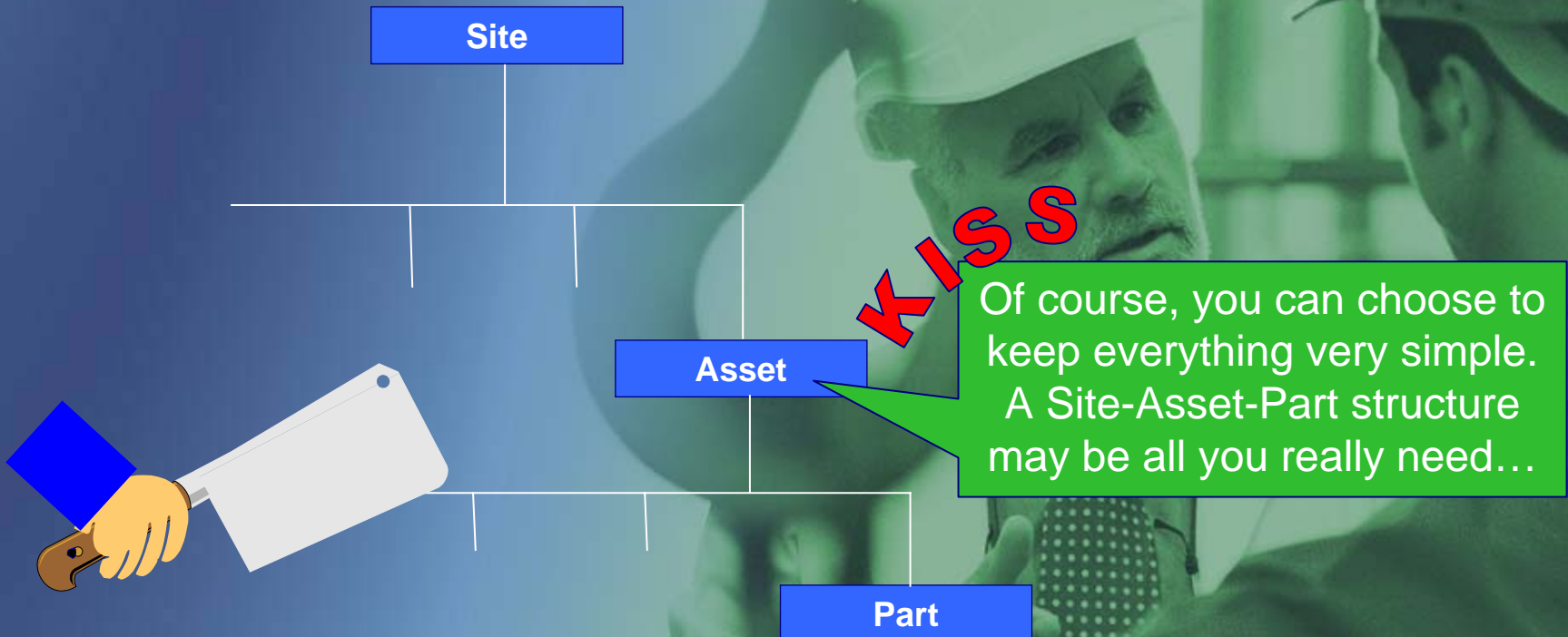
# Slicing & dicing - Asset Indenture Levels

...your 'Asset Tree'



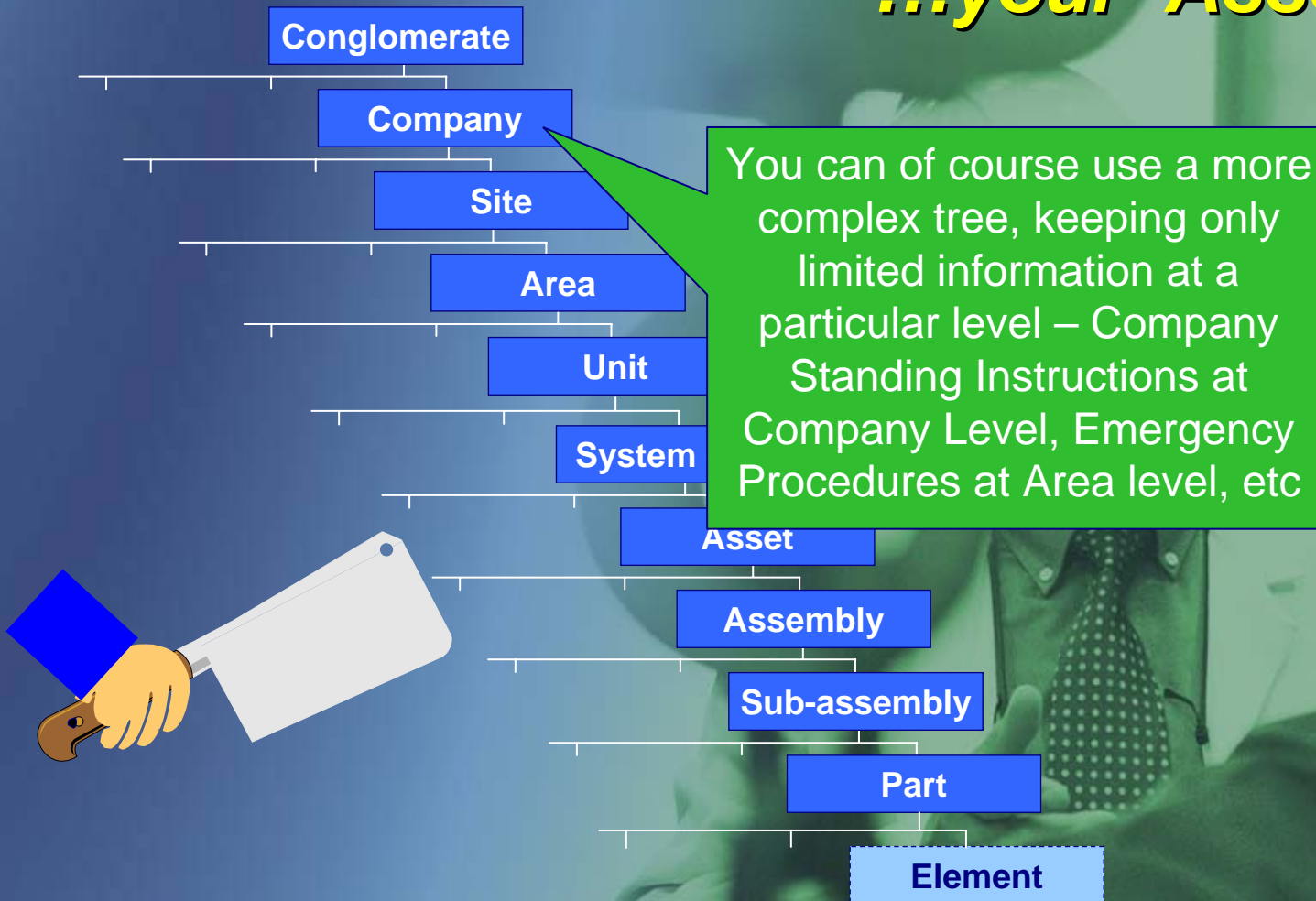
# Slicing & dicing - Asset Indenture Levels

*...your 'Asset Tree'*



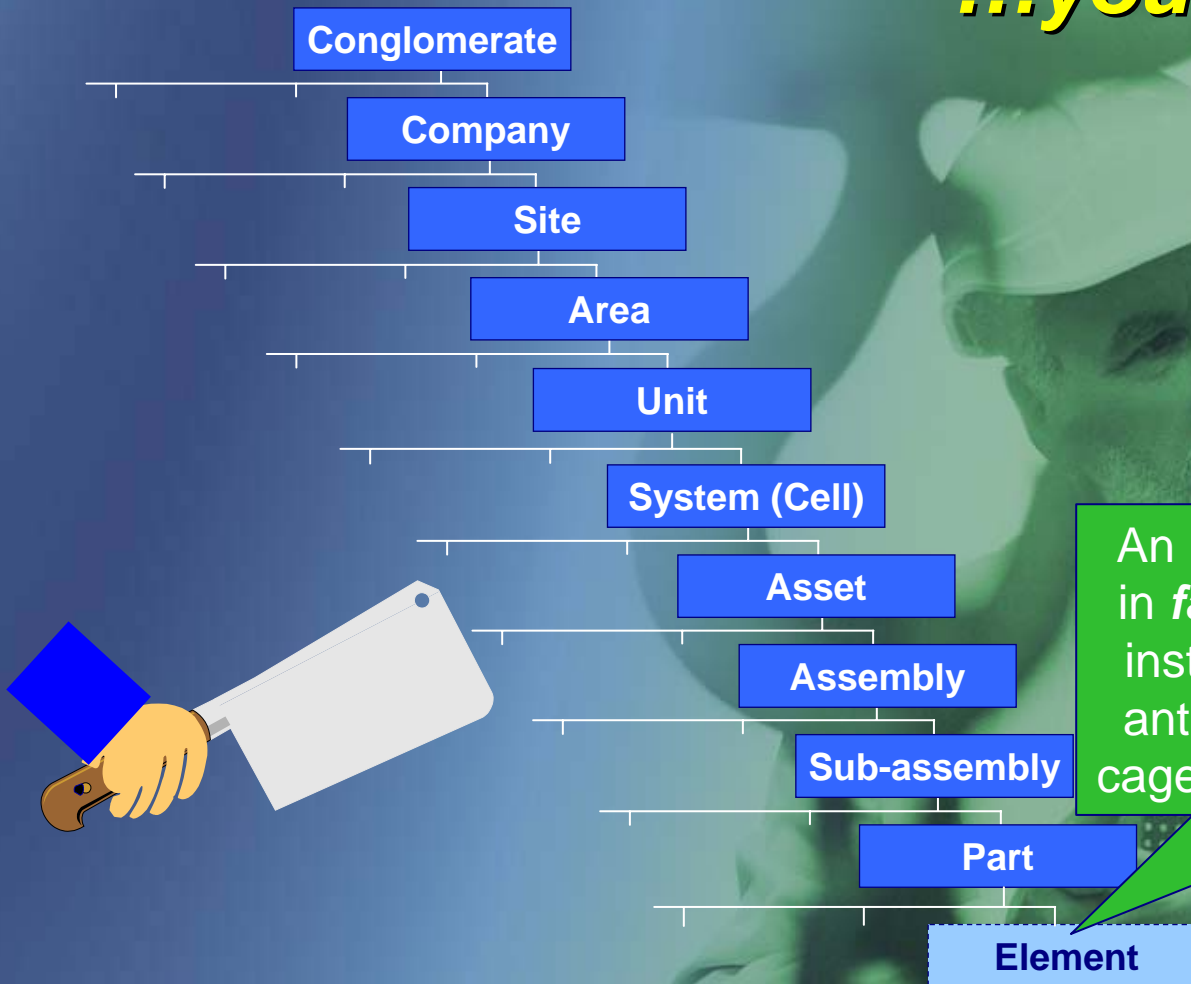
# Slicing & dicing - Asset Indenture Levels

*...your 'Asset Tree'*



# Slicing & dicing - Asset Indenture Levels

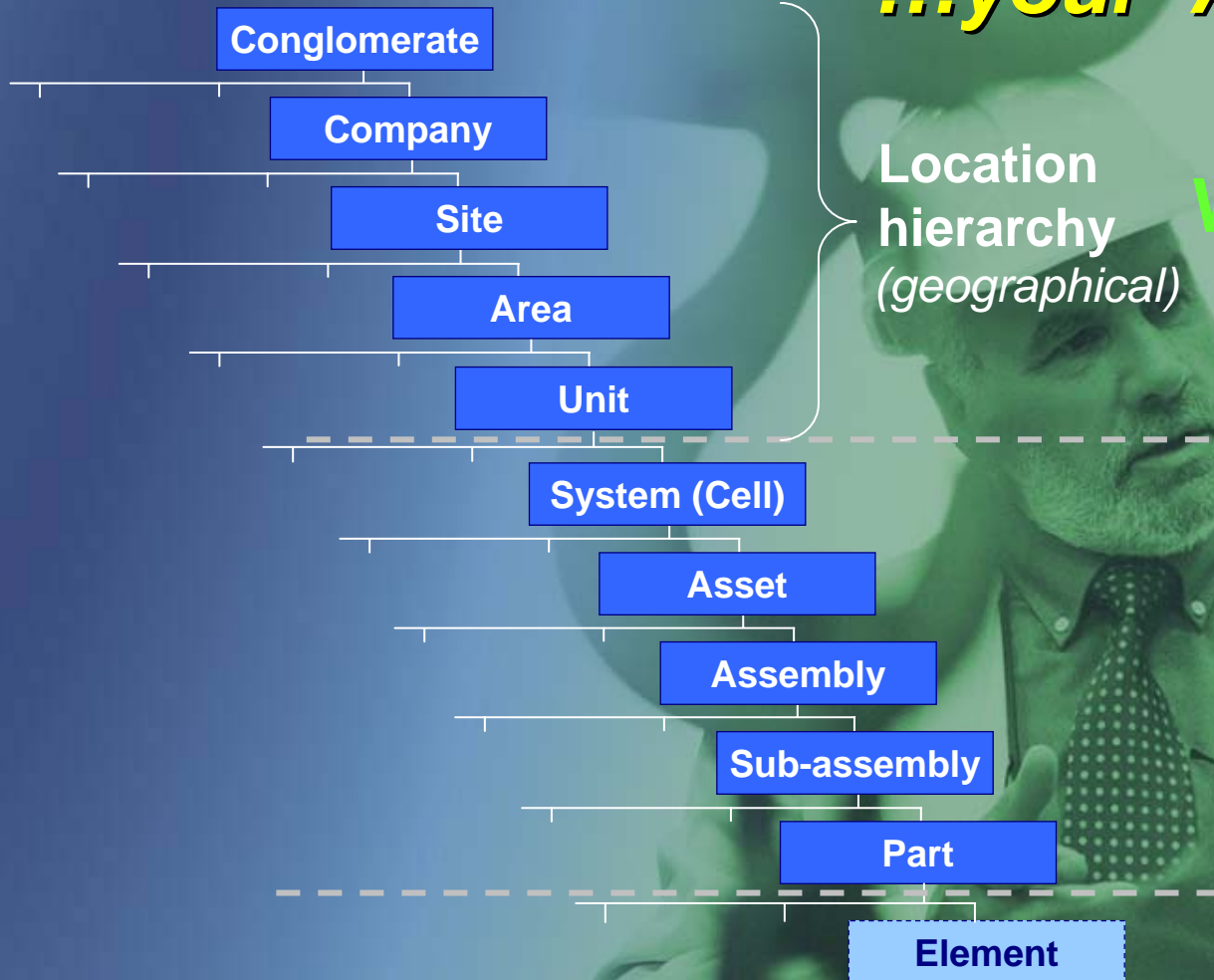
...your 'Asset Tree'



An 'Element' is of importance in *failure reporting* only. For instance, the Elements of an anti-friction ball bearing are - cage, balls, outer & inner races

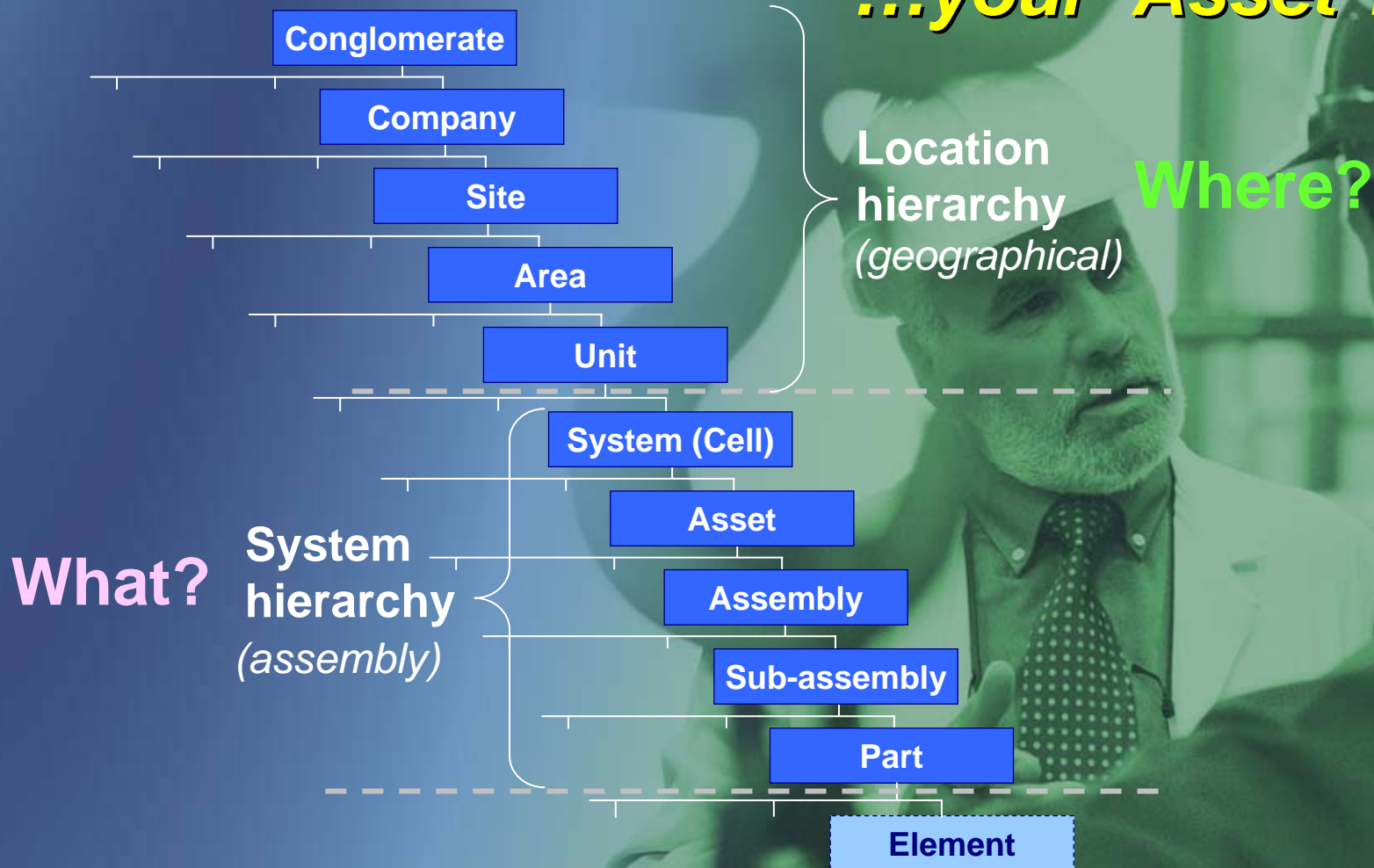
# Slicing & dicing - Asset Indenture Levels

...your 'Asset Tree'



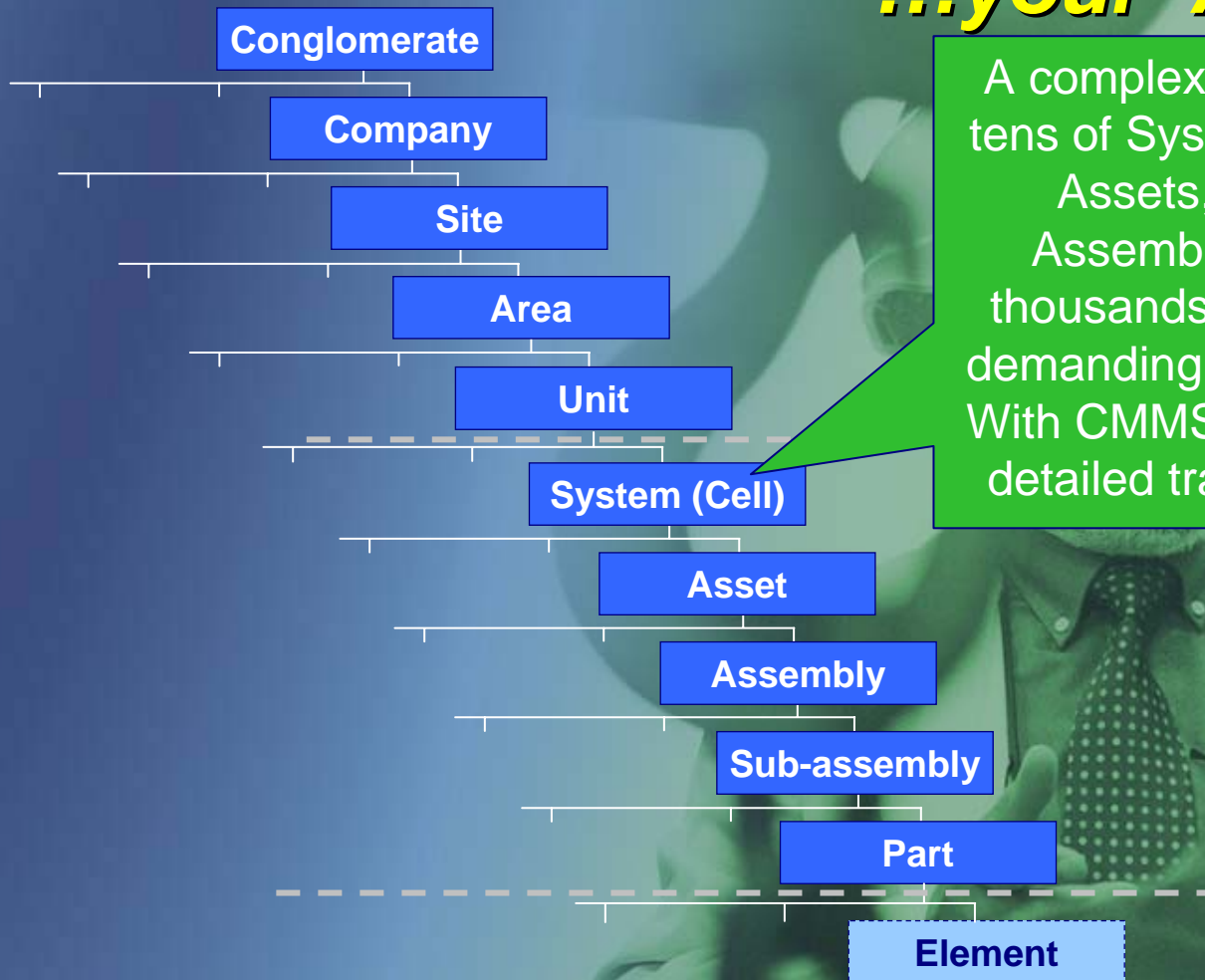
# Slicing & dicing - Asset Indenture Levels

...your 'Asset Tree'



# Slicing & dicing - Asset Indenture Levels

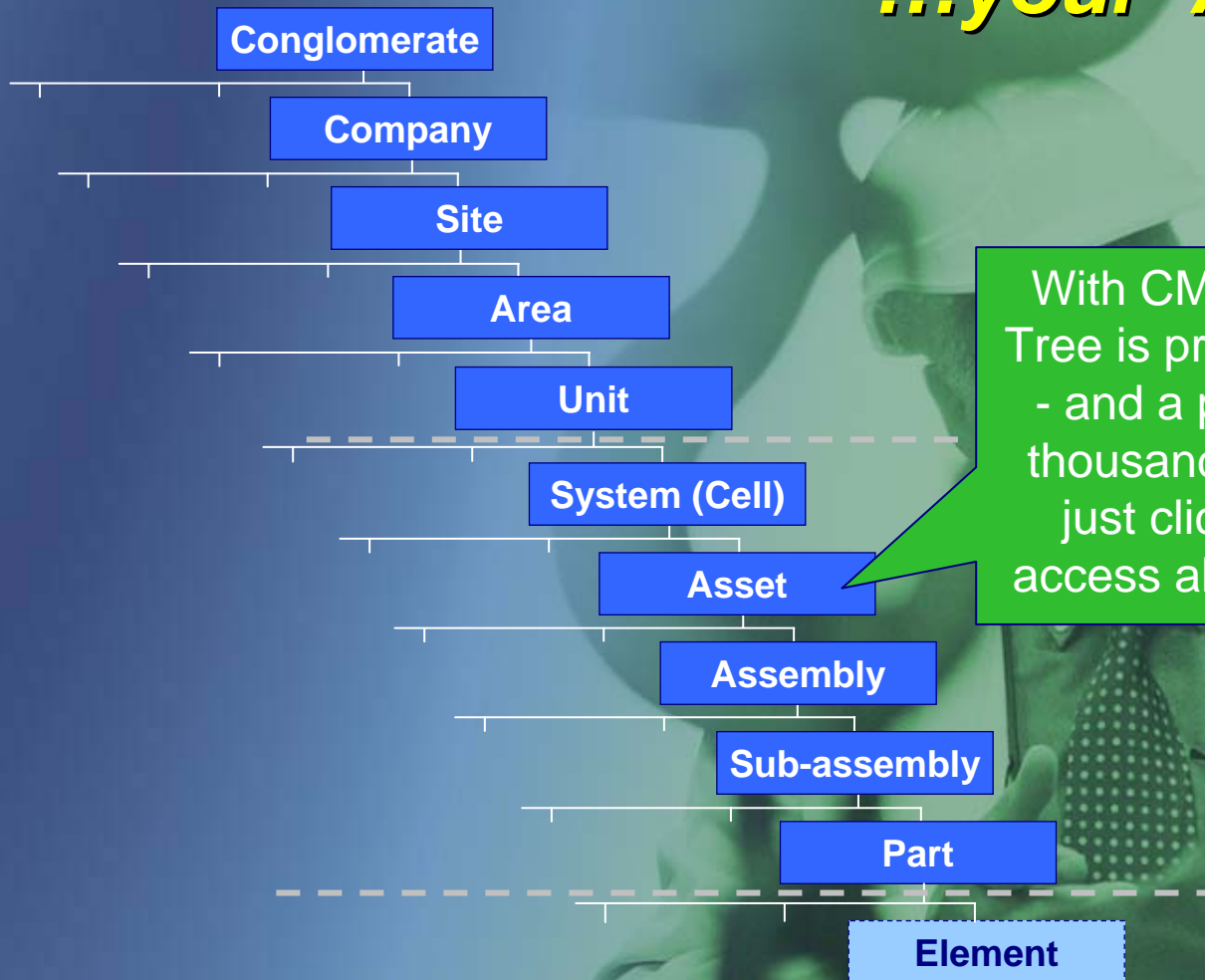
## ...your 'Asset Tree'



A complex facility may have tens of Systems, hundreds of Assets, thousands of Assemblies and tens of thousands of maintenance-demanding component Parts. With CMMS, it's easy to keep detailed track of all of these

# Slicing & dicing - Asset Indenture Levels

*...your 'Asset Tree'*

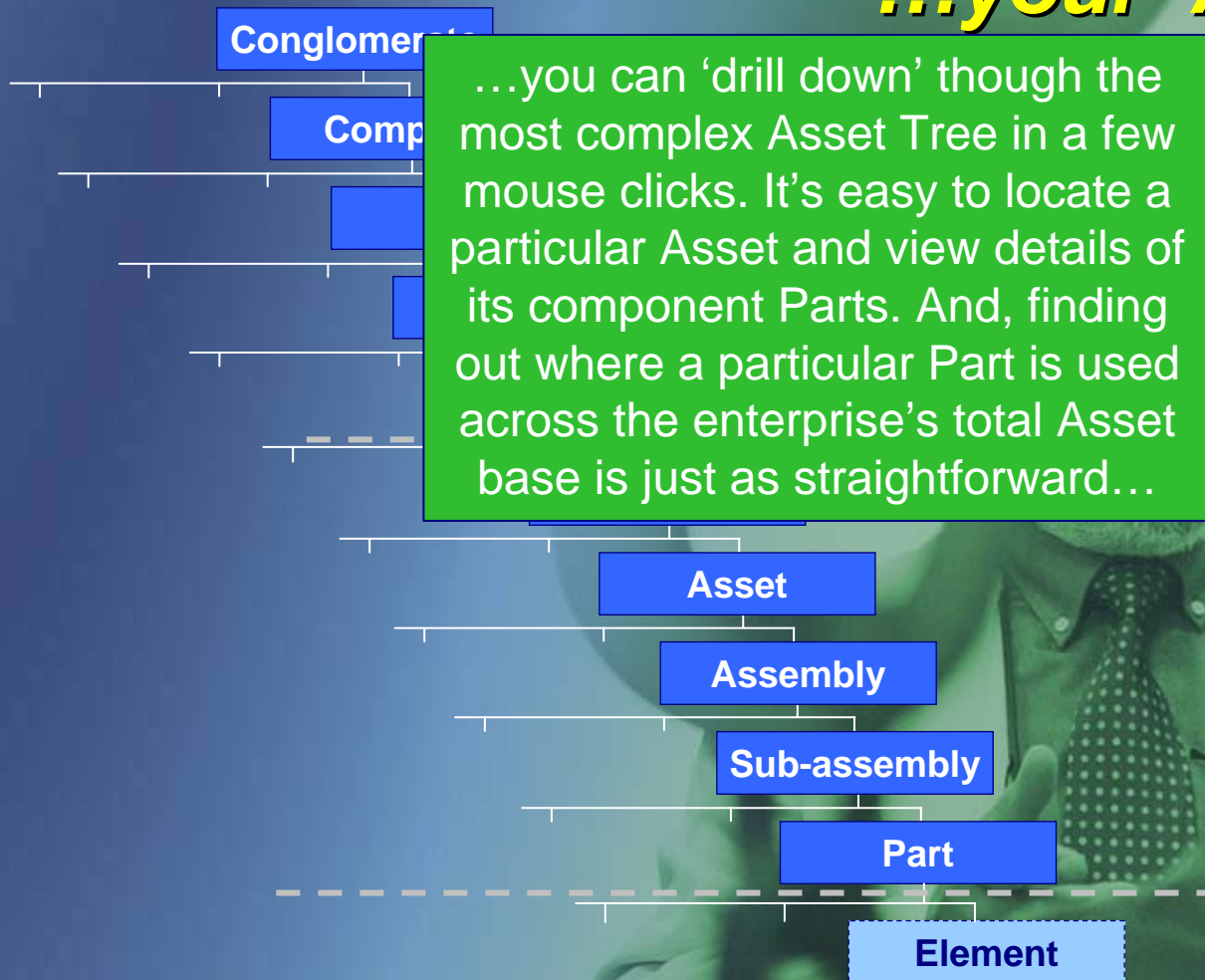


With CMMS, your Assets Tree is presented pictorially - and a picture is worth a thousand words. You can just click on an item to access all its information...

# Slicing & dicing - Asset Indenture Levels

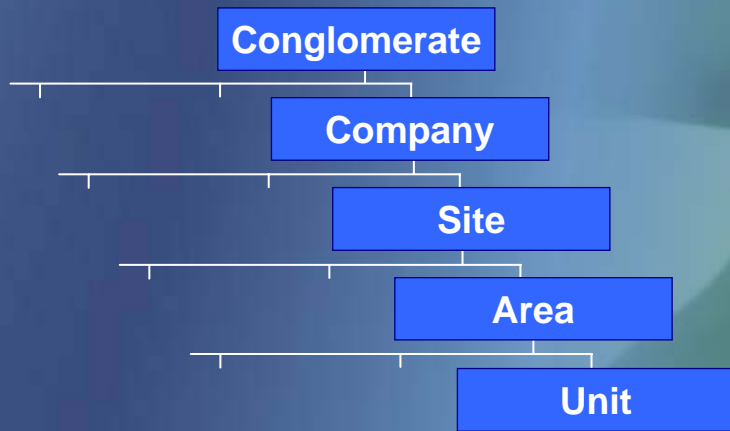
*...your 'Asset Tree'*

...you can 'drill down' through the most complex Asset Tree in a few mouse clicks. It's easy to locate a particular Asset and view details of its component Parts. And, finding out where a particular Part is used across the enterprise's total Asset base is just as straightforward...



# Slicing & dicing - Asset Indenture Levels

*...your 'Asset Tree'*



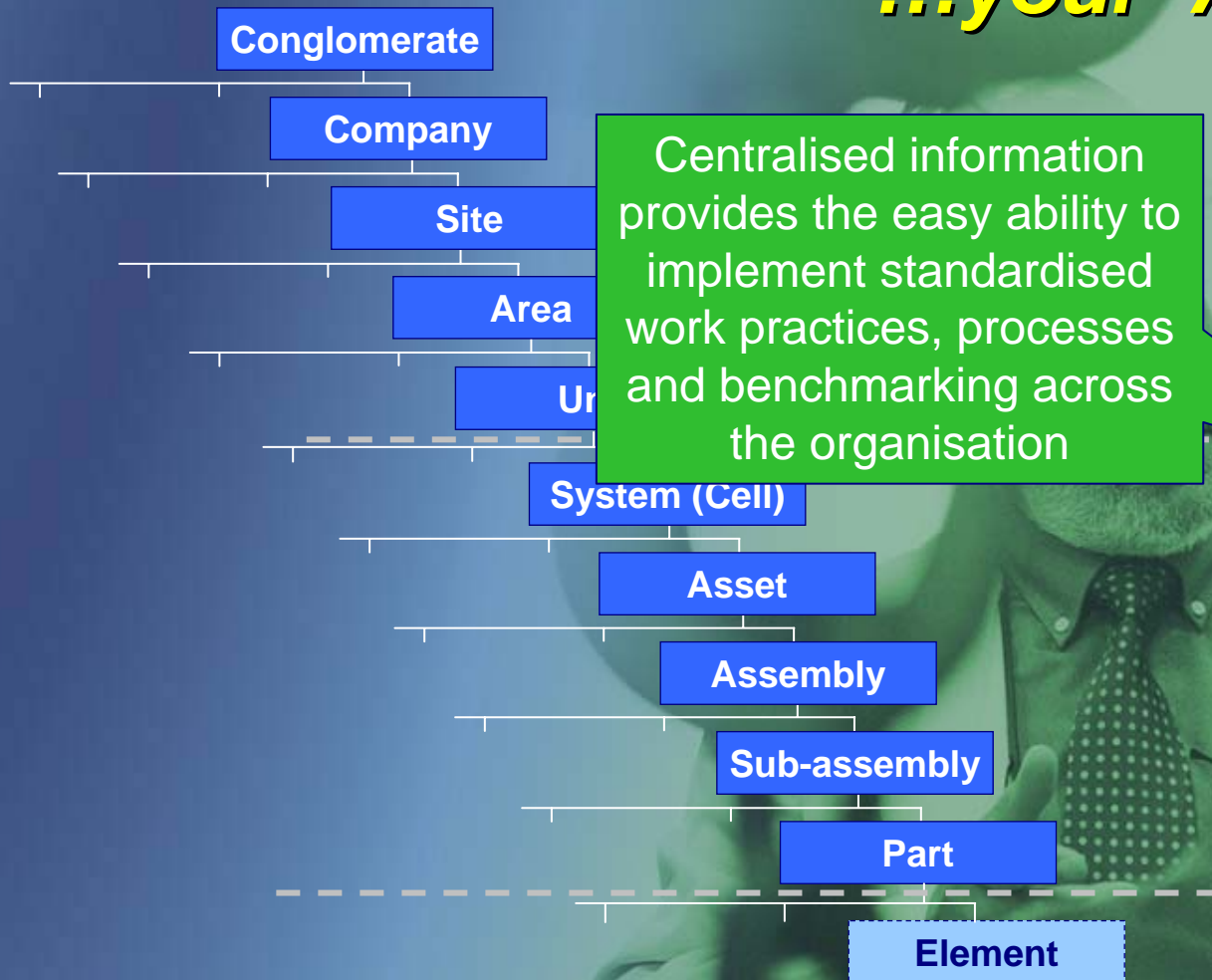
The data from multiple business units, geographies, plants and facilities can be centralised – whilst , at the same time, data confidentiality is assured because **segregation of users on a 'need-to-know' basis is easy with CMMS**



Element

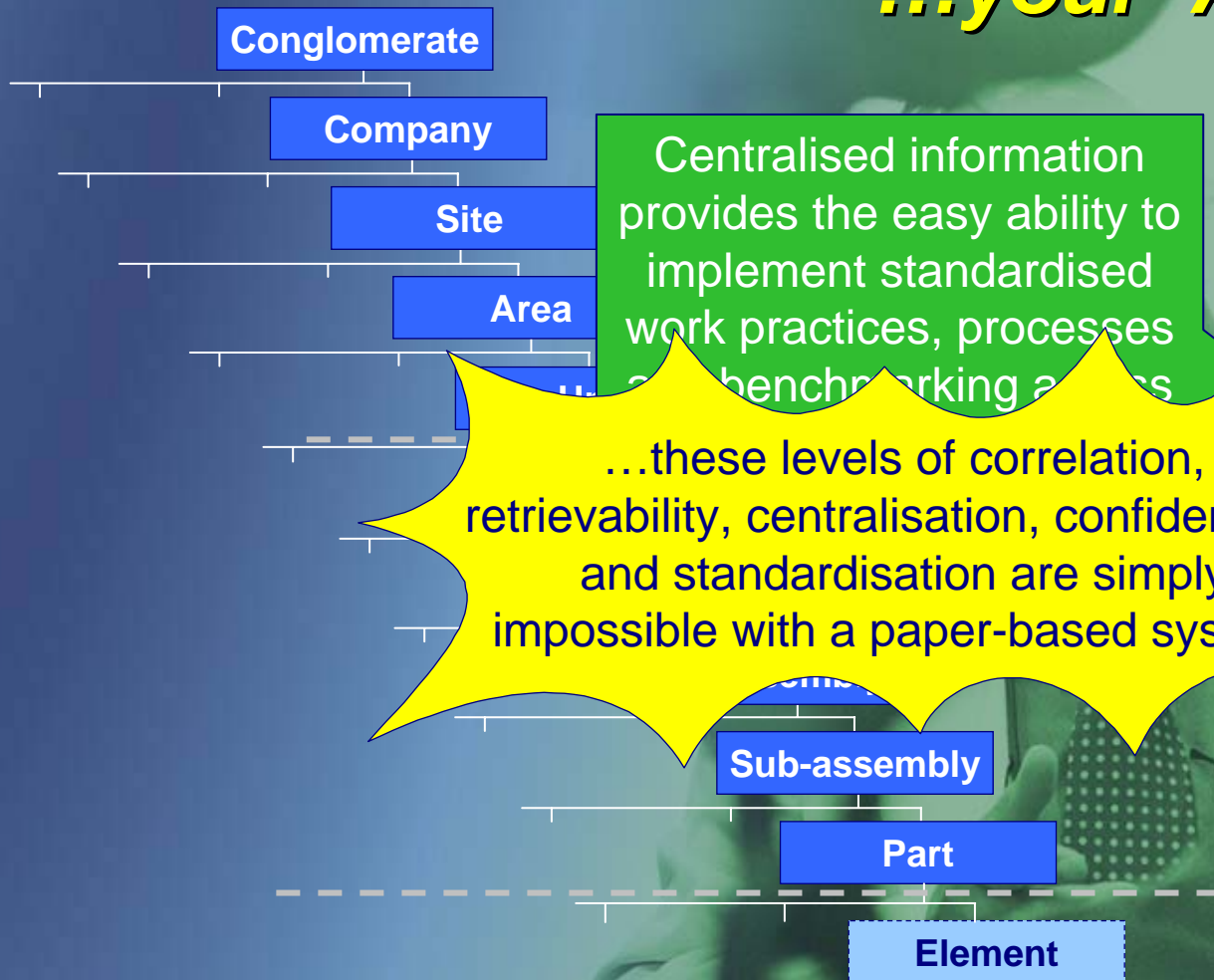
# Slicing & dicing - Asset Indenture Levels

*...your 'Asset Tree'*



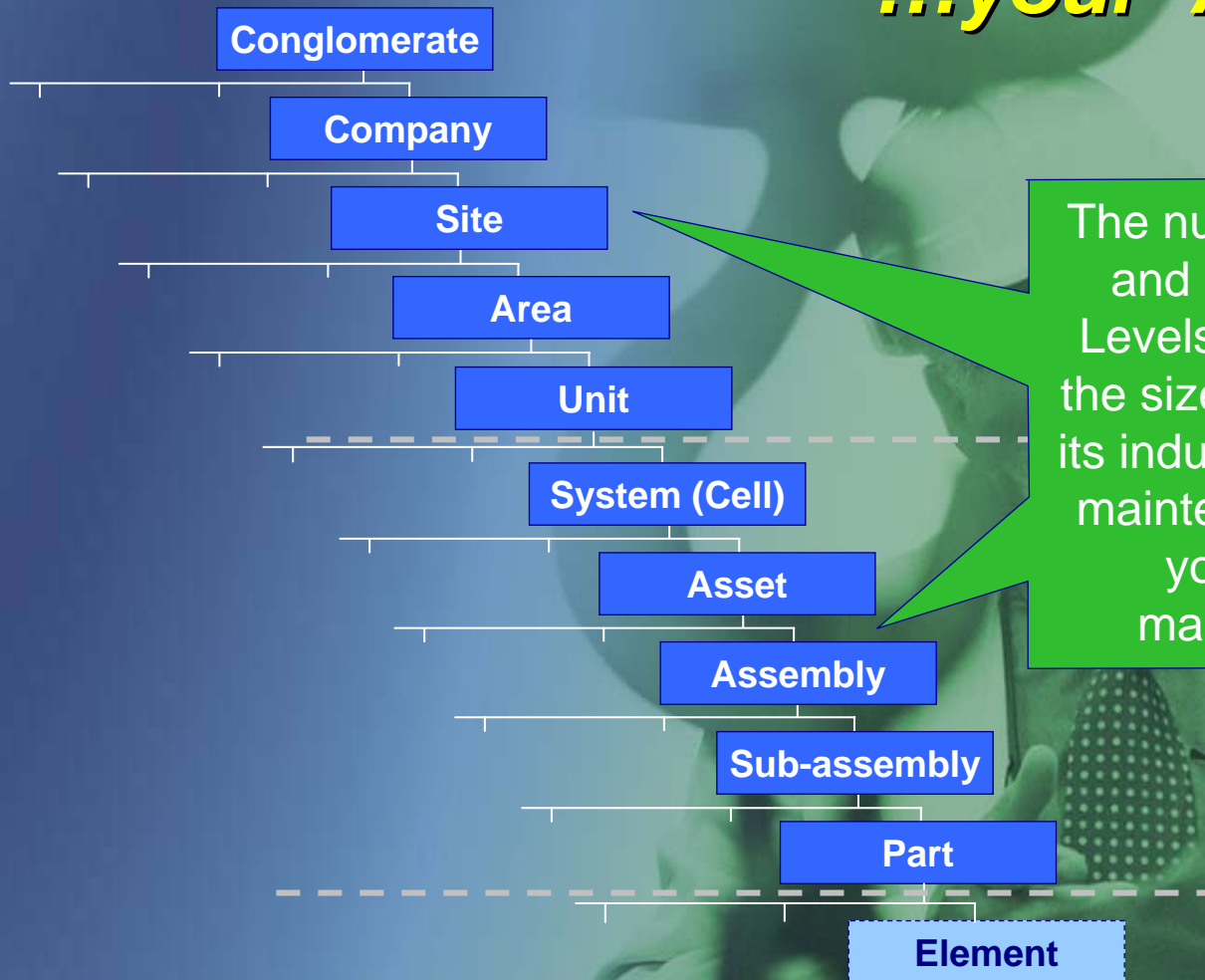
# Slicing & dicing - Asset Indenture Levels

*...your 'Asset Tree'*



# Slicing & dicing - Asset Indenture Levels

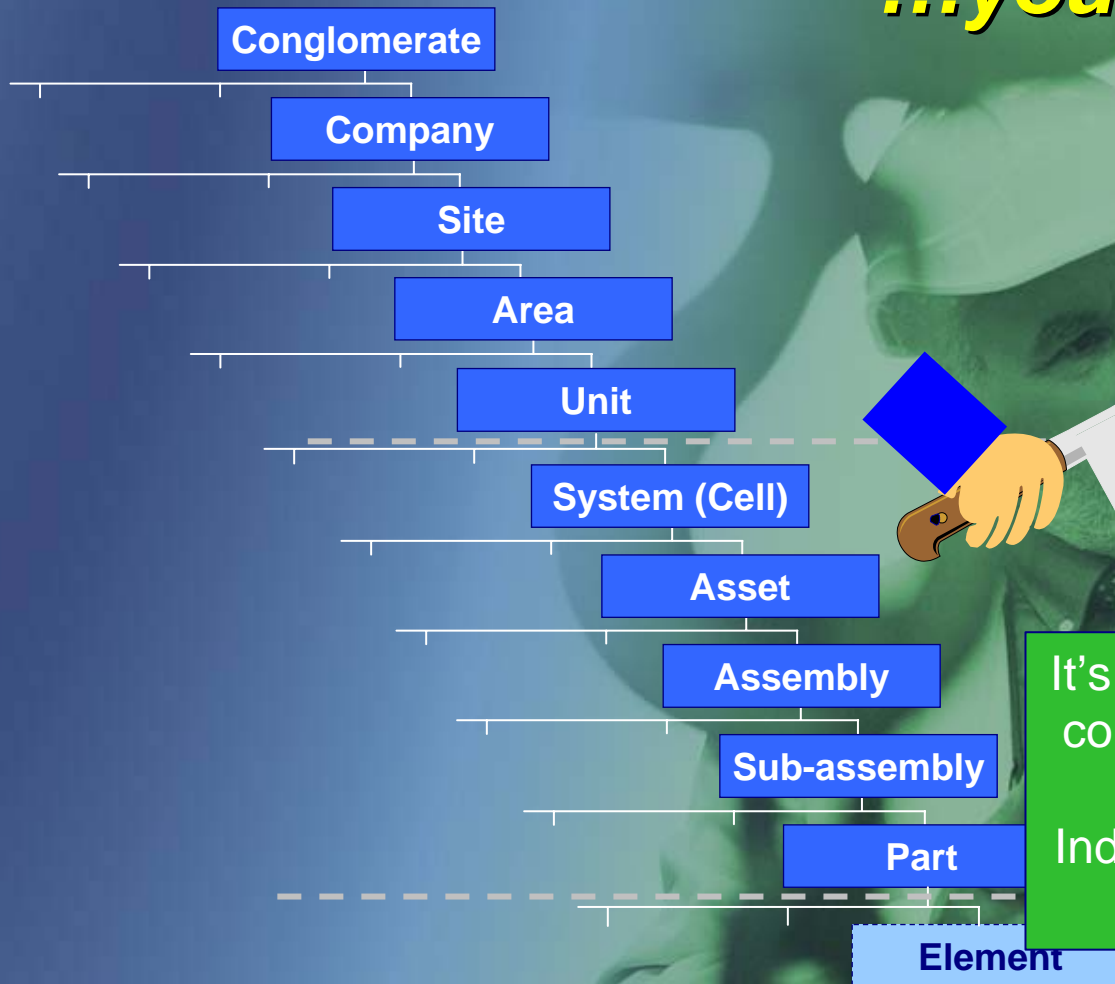
*...your 'Asset Tree'*



The number of geographical and assembly Indenture Levels needed depends on the size of your organisation, its industrial sector, your own maintenance strategy - and your organisation's maintenance maturity

# Slicing & dicing - Asset Indenture Levels

*...your 'Asset Tree'*



It's easy to set up, track, control and consolidate as many Asset Indenture Levels as you like in your CMMS

# Slicing & dicing - Asset Indenture Levels

...your 'Asset Tree'

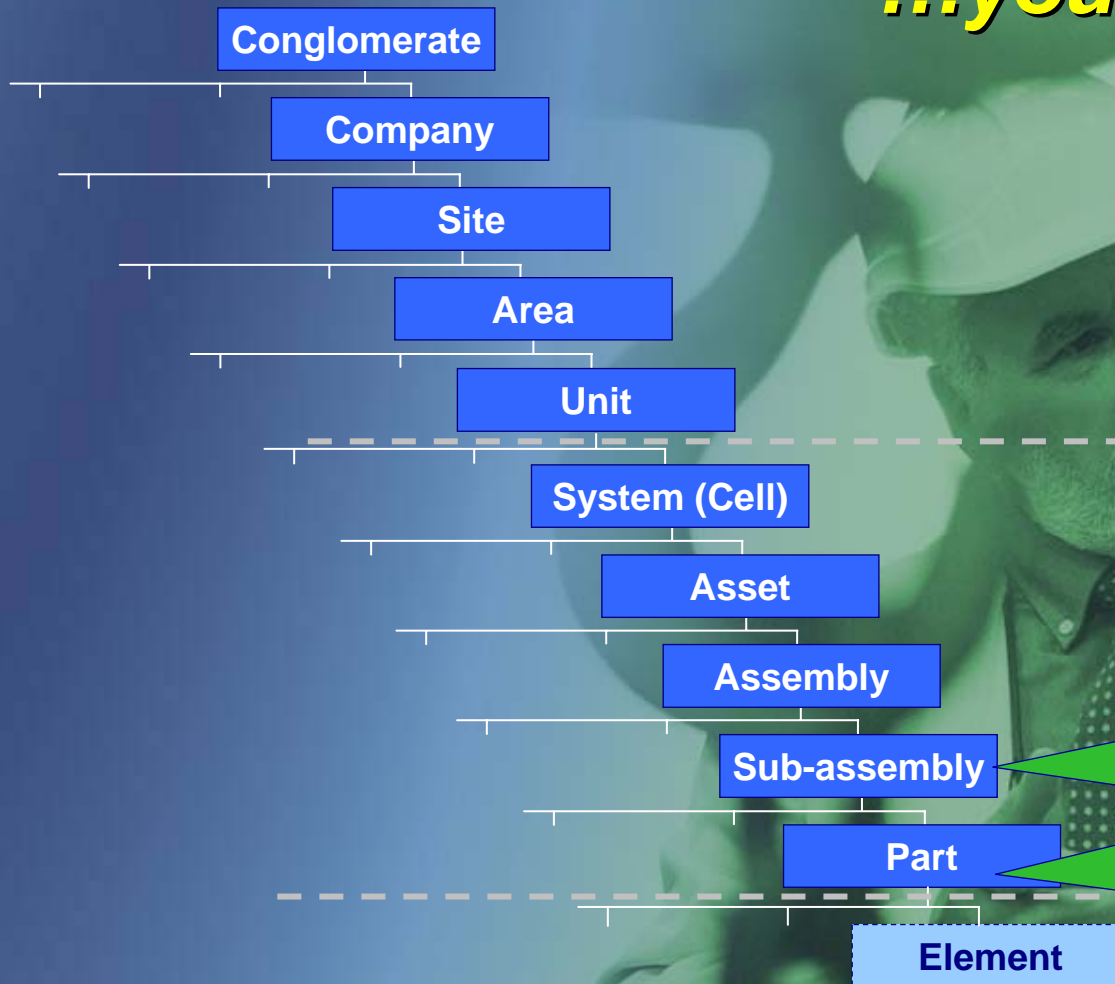


...but minimise the number of Levels consistent with business needs



# Slicing & dicing - Asset Indenture Levels

*...your 'Asset Tree'*



These also link into the Materials Management component of your CMMS. Integrated!

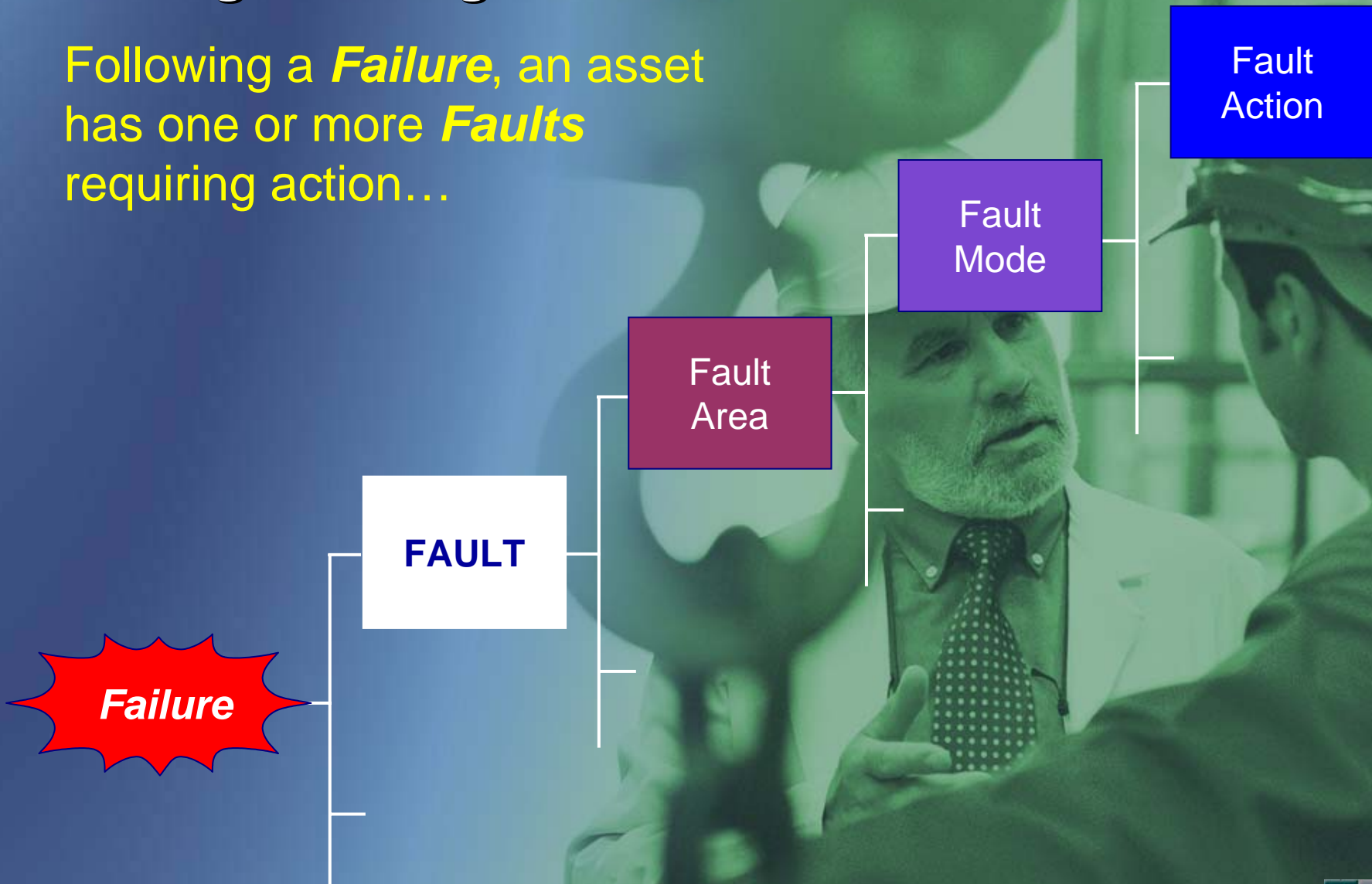


*Slicing and dicing Asset Management Data*

## **Failures and Faults**

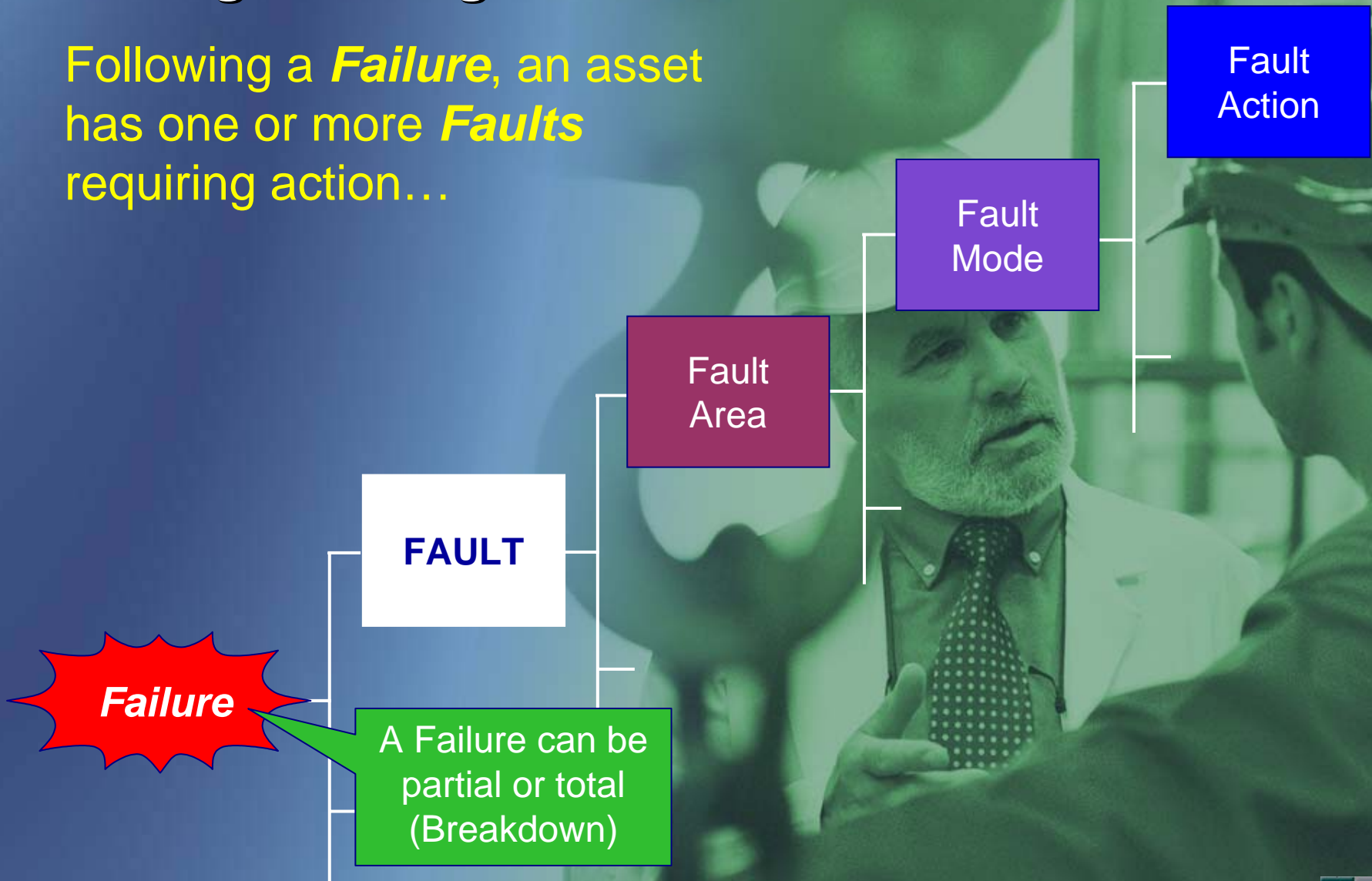
# Slicing & dicing – Failures and Faults

Following a **Failure**, an asset has one or more **Faults** requiring action...



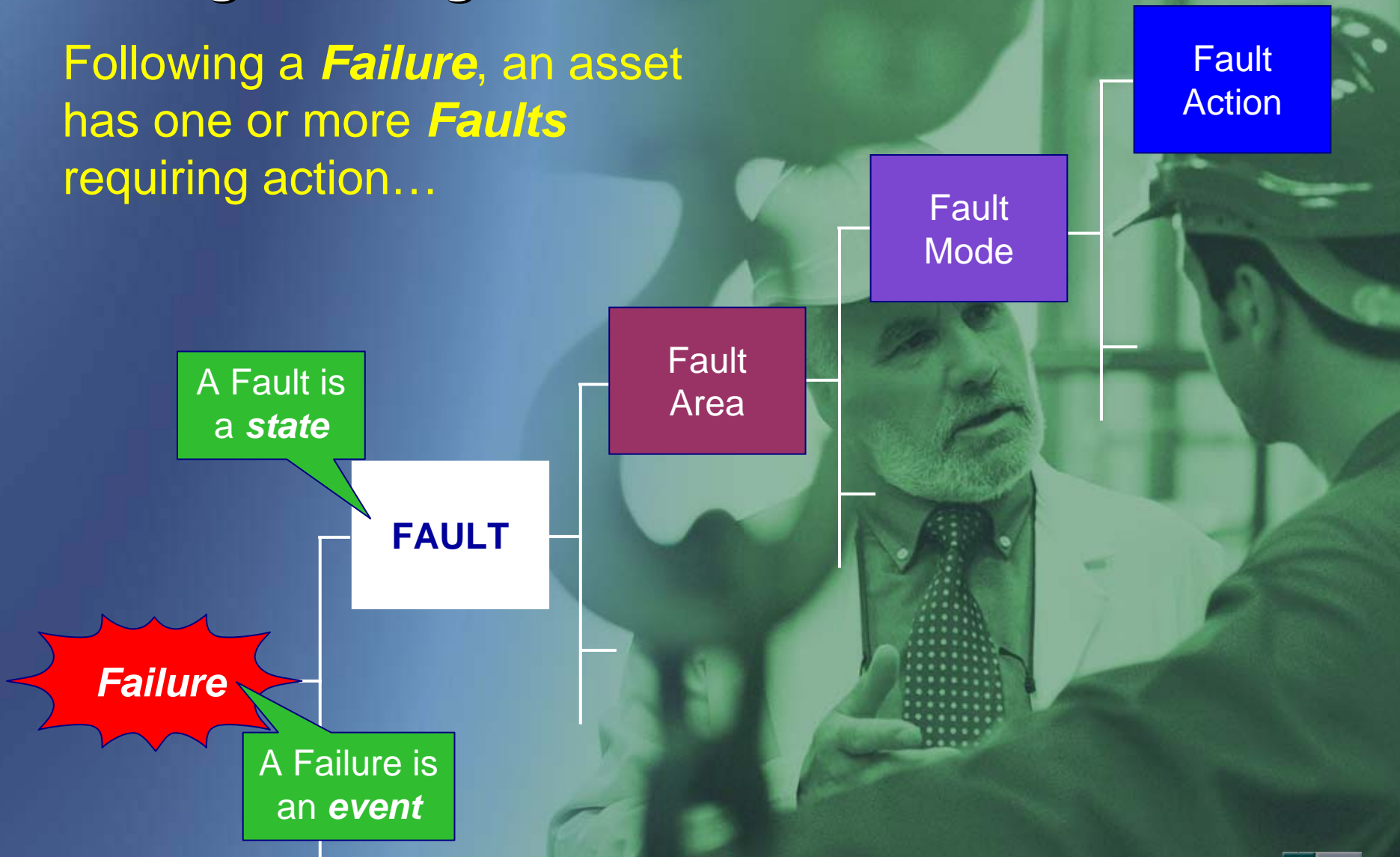
# Slicing & dicing – Failures and Faults

Following a **Failure**, an asset has one or more **Faults** requiring action...



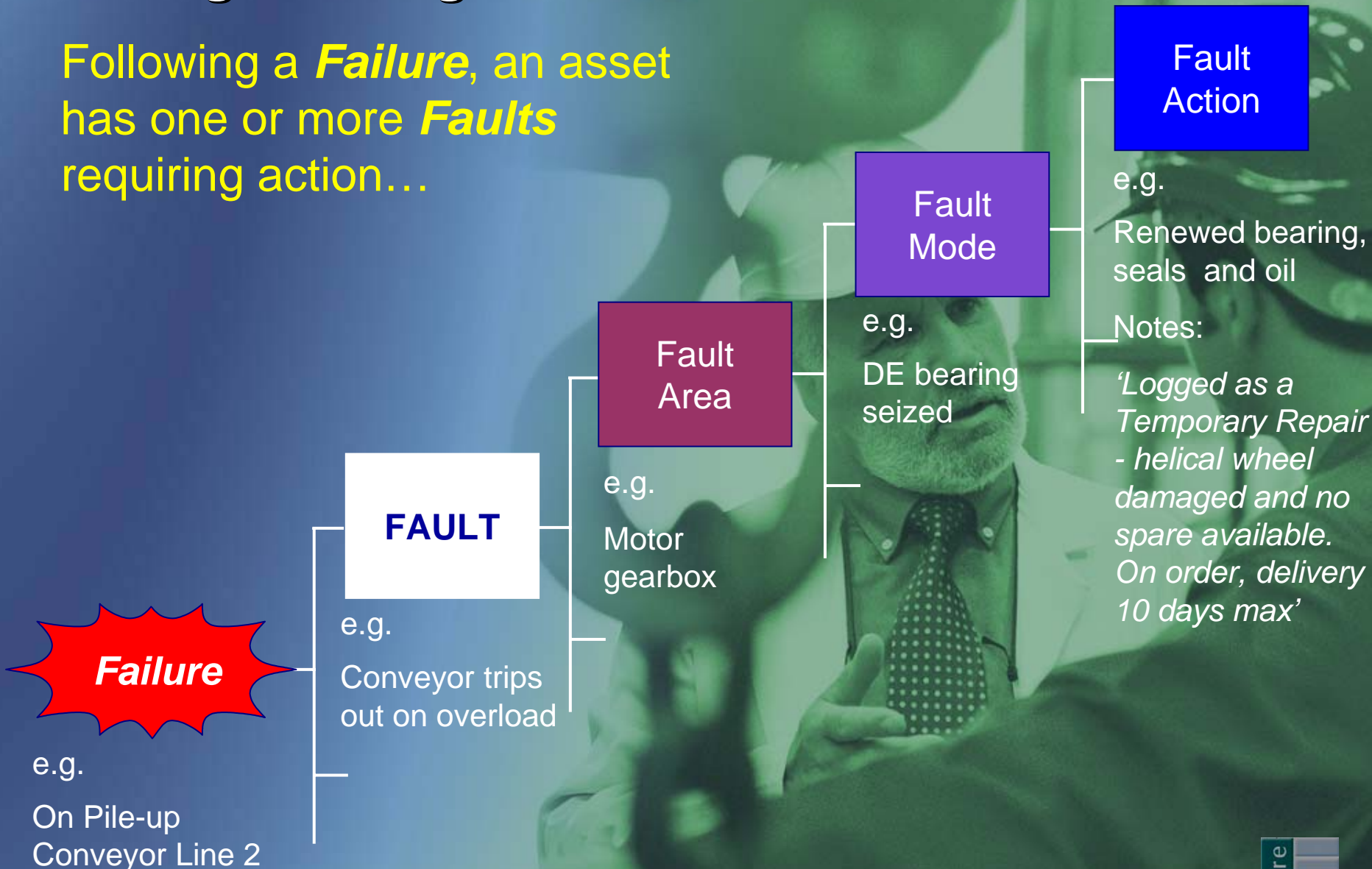
# Slicing & dicing – Failures and Faults

Following a **Failure**, an asset has one or more **Faults** requiring action...



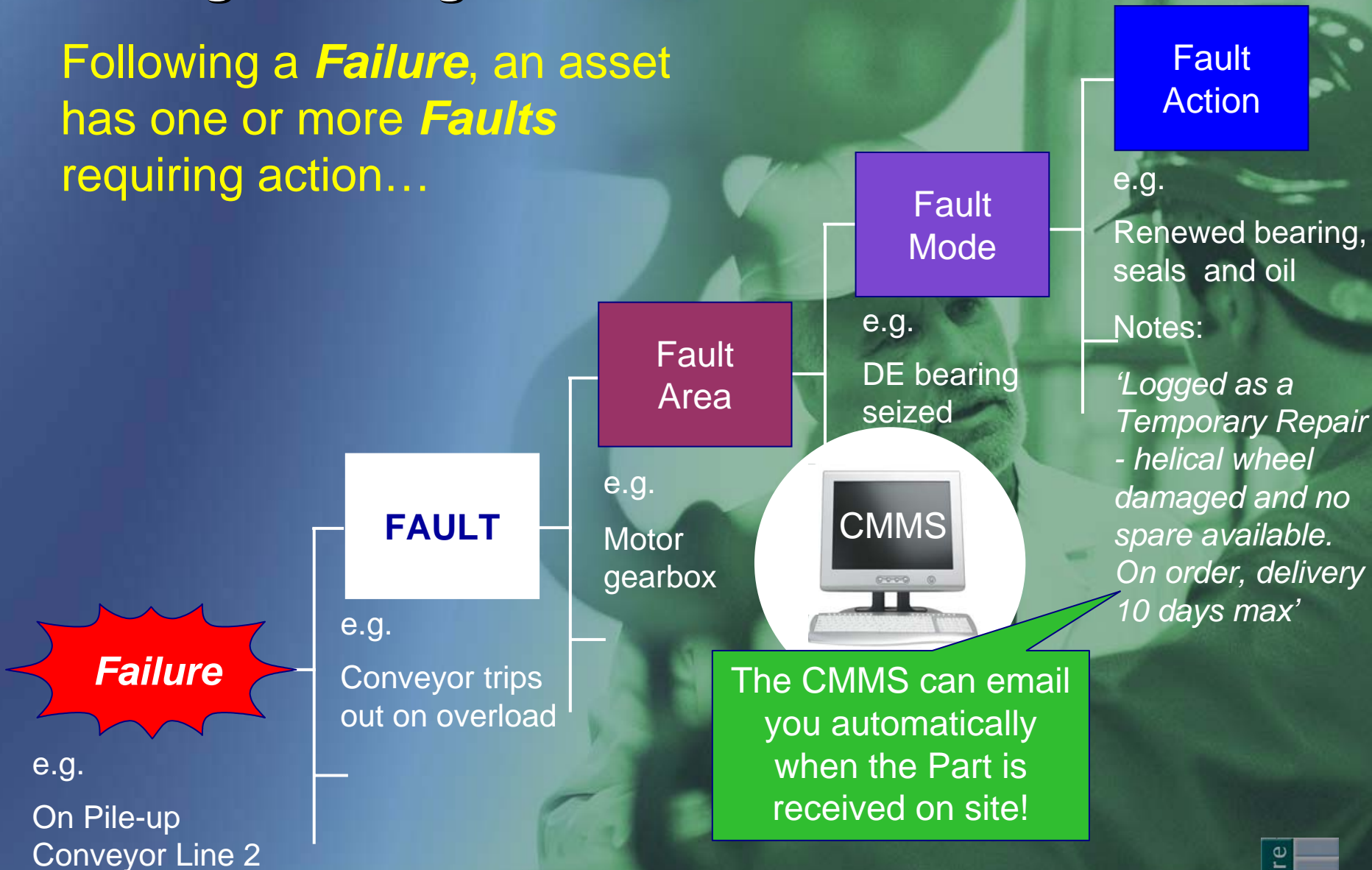
# Slicing & dicing – Failures and Faults

Following a **Failure**, an asset has one or more **Faults** requiring action...



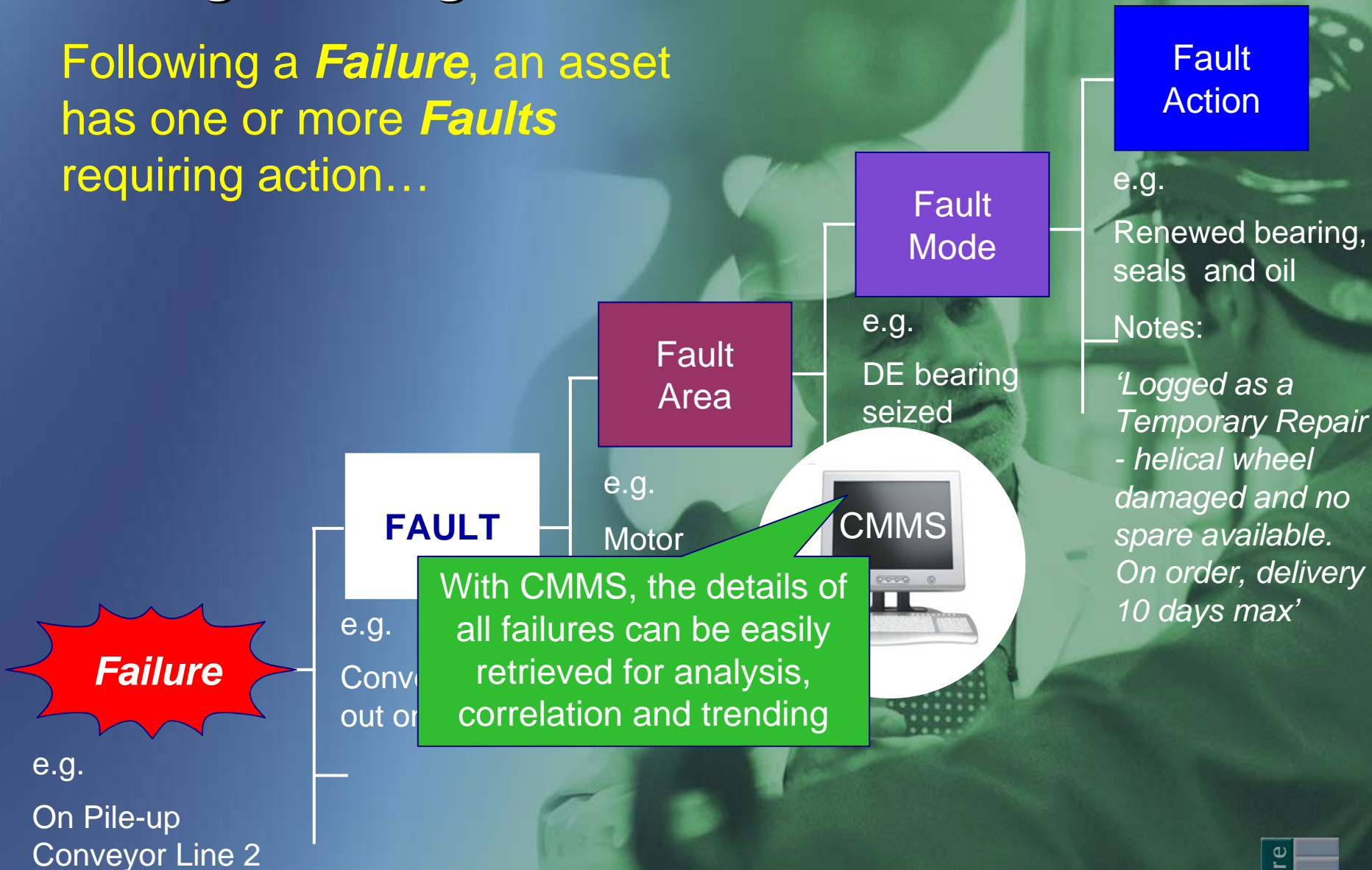
# Slicing & dicing – Failures and Faults

Following a **Failure**, an asset has one or more **Faults** requiring action...

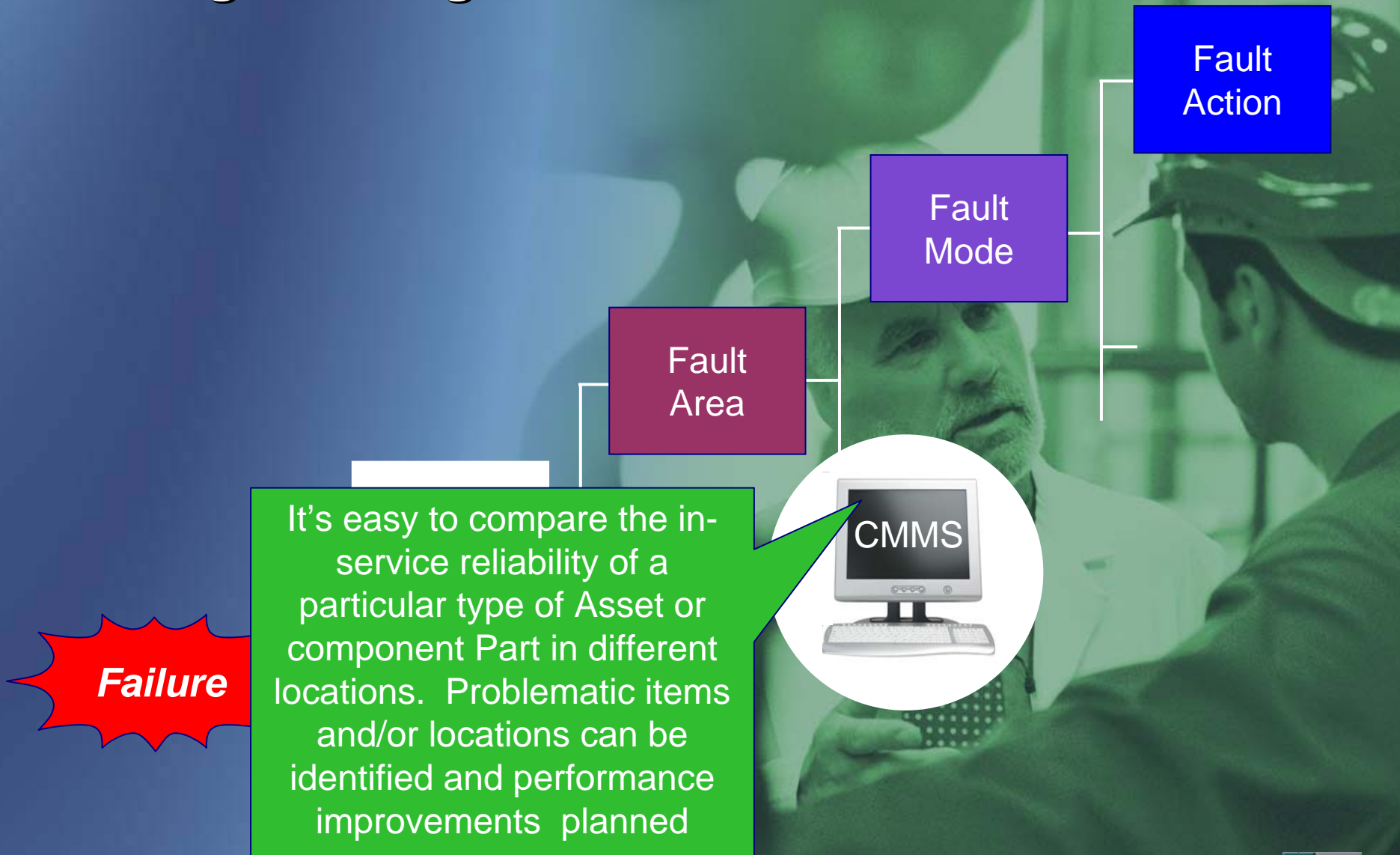


# Slicing & dicing – Failures and Faults

Following a **Failure**, an asset has one or more **Faults** requiring action...



# Slicing & dicing – Failures and Faults



# Slicing & dicing – Failures and Faults

The reasons for poorly performing items can be identified by analysing and comparing of their installation environments, usage patterns, operator care regimes, PM Routines, process suitability/capability, etc

**FAULT**

**Failure**

Fault Mode

Fault Action



# Slicing & dicing – Failures and Faults

When failure occurs due to an item being sub-standard or unsuitable for its duty, it must be swapped or its configuration modified as necessary. When the problematic item could be installed in multiple locations across the organisation, with CMMS, its easy to check and find out where!



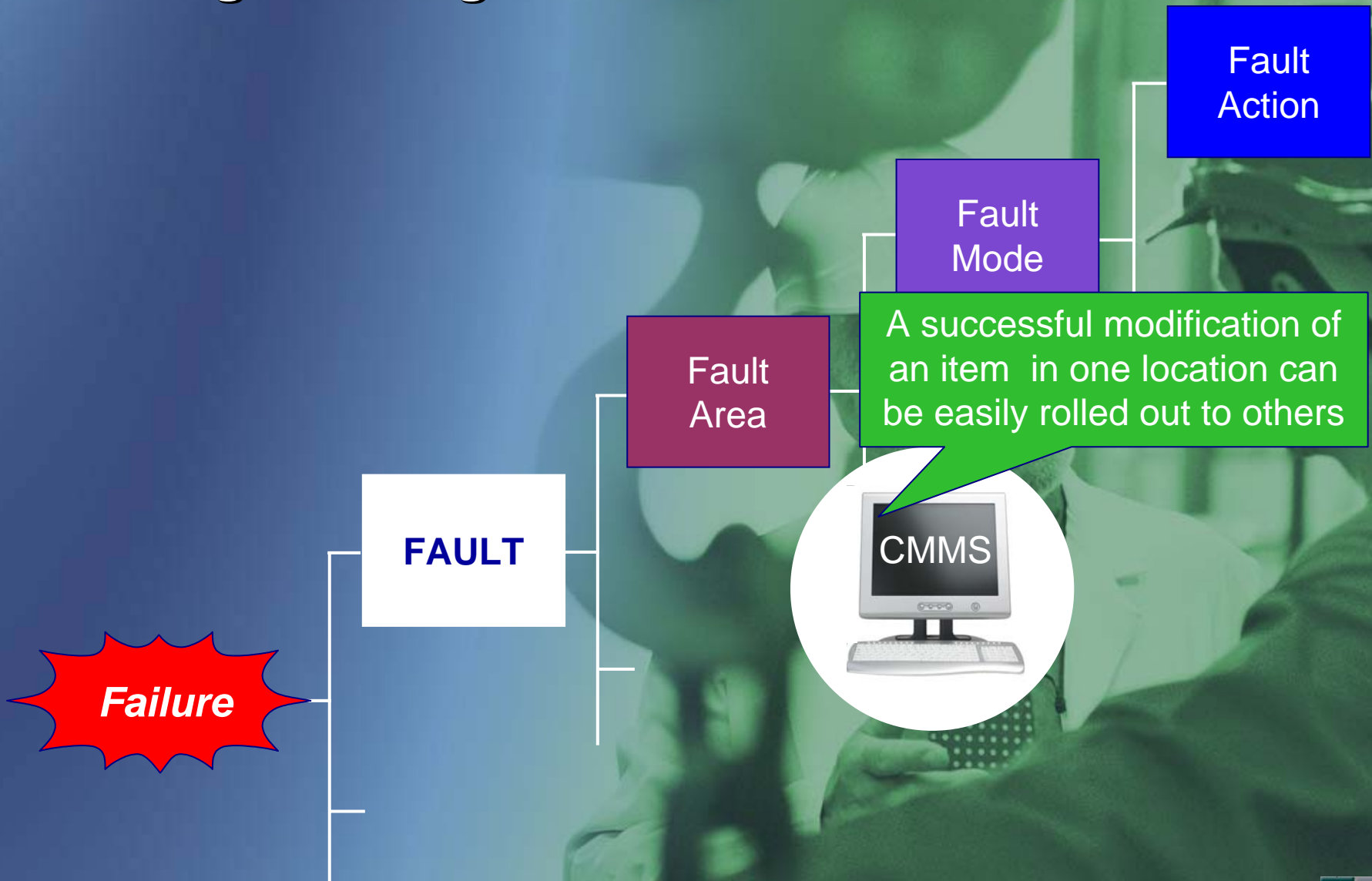
Fault Area

Fault Mode

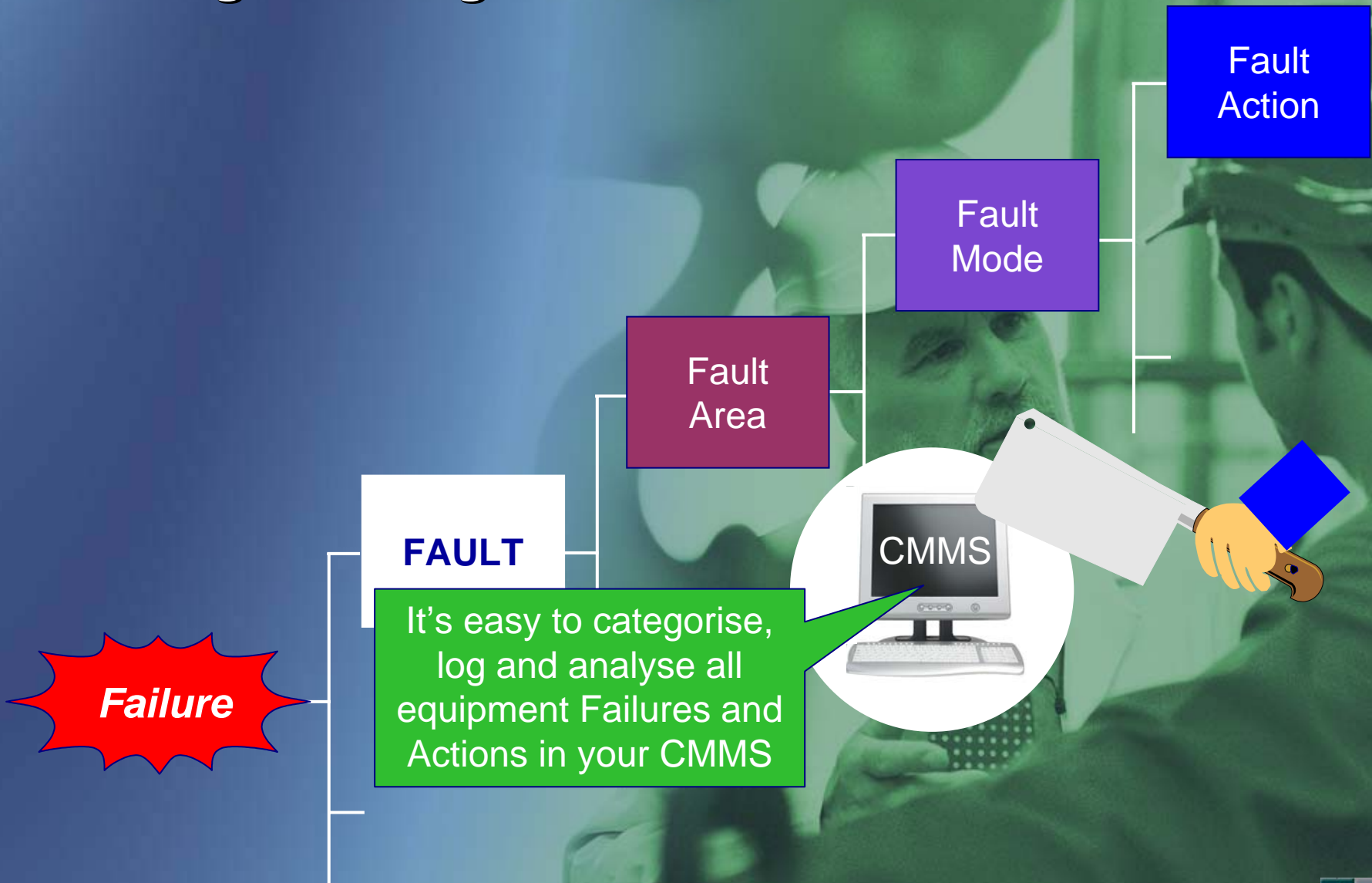
Fault Action

Fa

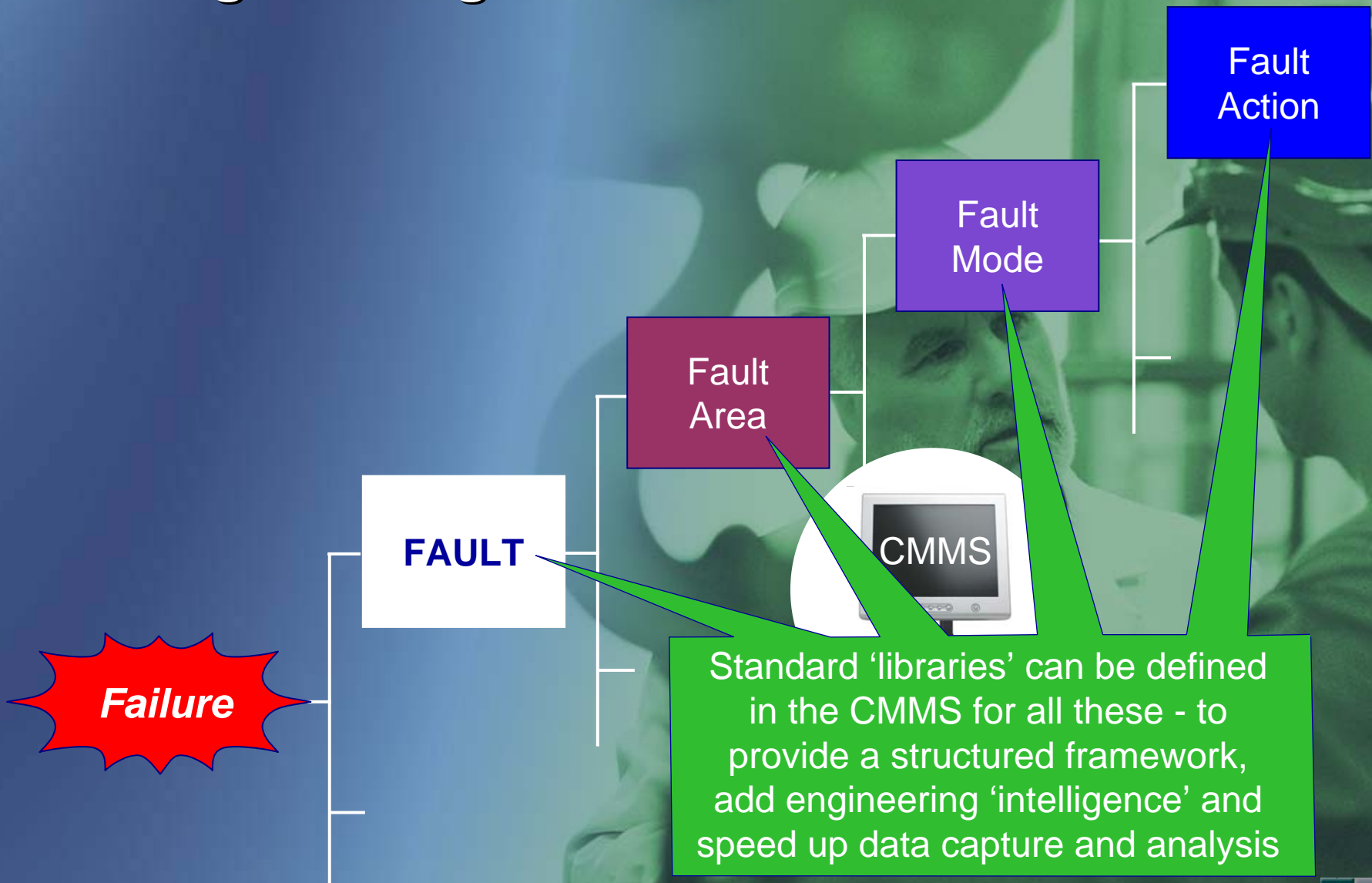
# Slicing & dicing – Failures and Faults



# Slicing & dicing – Failures and Faults



# Slicing & dicing – Failures and Faults



# Slicing & dicing – Failures and Faults

**KISS**

...but minimise the number of categories consistent with real Engineering needs

**Failure**

Standard 'libraries' can be defined in the CMMS for all these - to provide a structured framework, add engineering 'intelligence' and speed up data capture and analysis

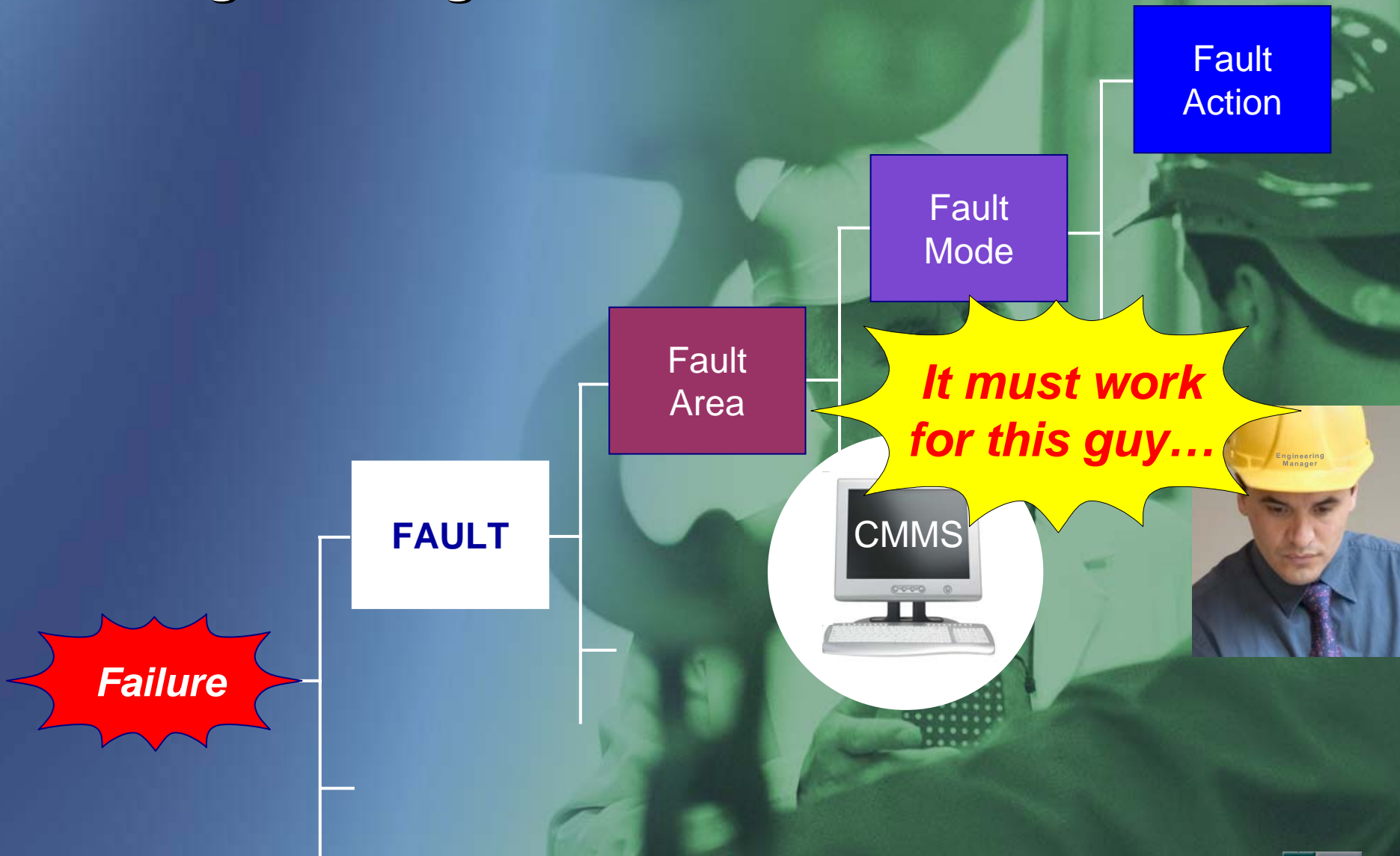
Fault Mode

Fault Action

Fault

CMMS

# Slicing & dicing – Failures and Faults





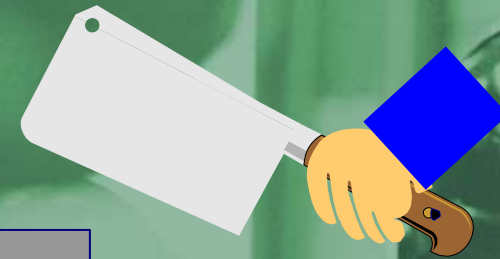
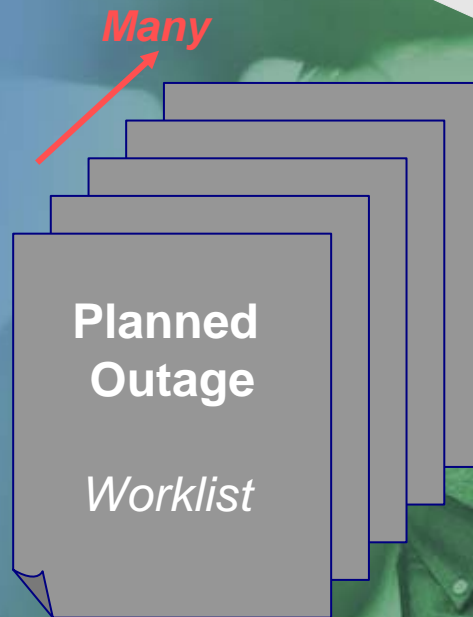
*Slicing and dicing Asset Management Data*  
**Outage Work Packages**

# Slicing & dicing – Outage Work Packages

*Packages of Work Orders that can only be completed with facilities off-line...*

- When maintenance and engineering work can be completed with the target assets still in service, scheduling and completing the work is relatively straightforward
- When one or more significant assets – or an entire facility - must be out of service to complete a Worklist of outstanding work, careful planning is necessary in order to take advantage of an ad-hoc opportunity outage or minimise the required downtime for a planned outage
- Individual Work Orders must be bundled together into Work Packages for programmed execution during the outage
- These Work Packages are treated essentially like ‘projects’ – they have start and finish time constraints, involve many assets, require multiple resources, shared services, special permissions and some may have individual budgets
- Flagging a Work Package with a ‘project identifier’ is not enough. To manage it technically and economically, an identifier for the type of facilities outage that will allow sufficient ‘access’ to the target assets is also required. There are three basic types of outages...

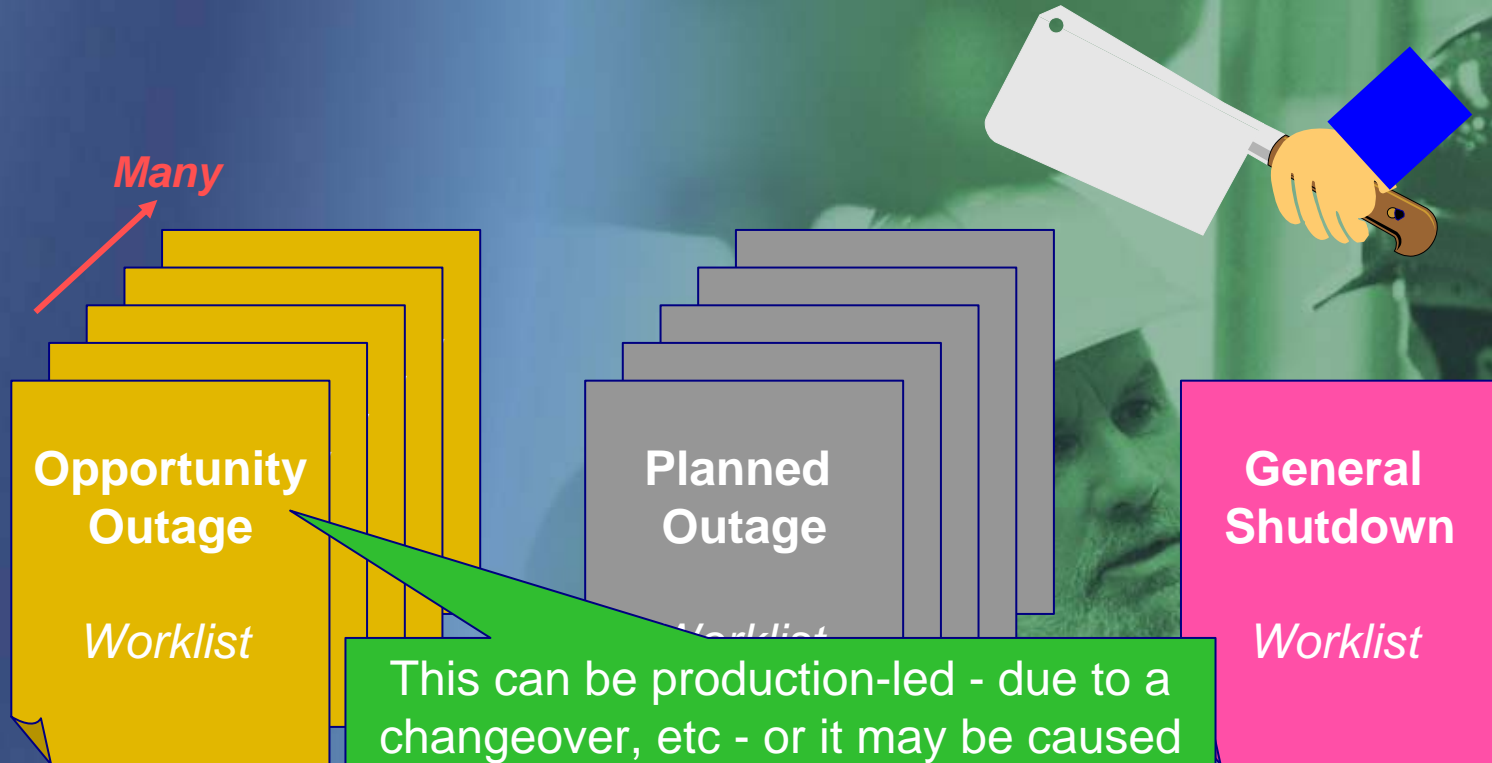
# Slicing & dicing – Outage Work Packages



*ONE only!*

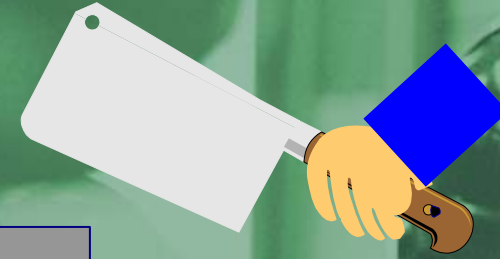
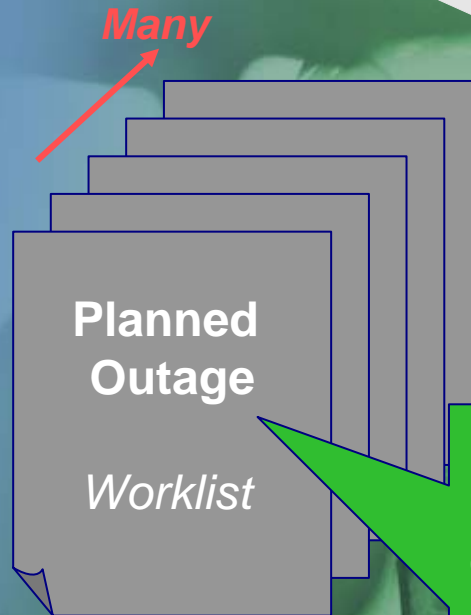


# Slicing & dicing – Outage Work Packages



This can be production-led - due to a changeover, etc - or it may be caused by a facilities breakdown. Unless the incident causing the outage is serious and extended, the work is mainly small repairs and adjustments. Each section of plant has its own Worklist which can be launched a moment's notice, as and when an opportunity arises

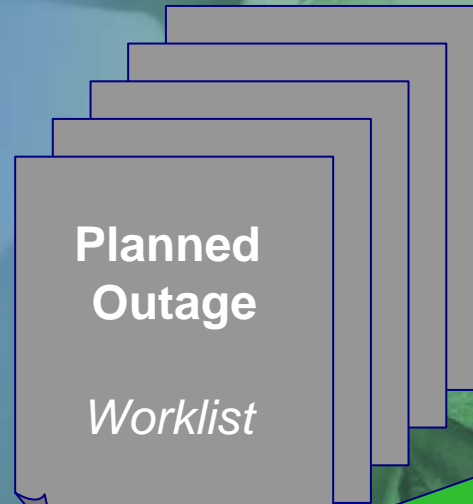
# Slicing & dicing – Outage Work Packages



General  
Shutdown

A maintenance-led outage for an intrusive intervention on a section of the facility – it usually involves major dismantling of equipment. These are normally annual events. Each section of plant has its own Worklist

# Slicing & dicing – Outage Work Packages

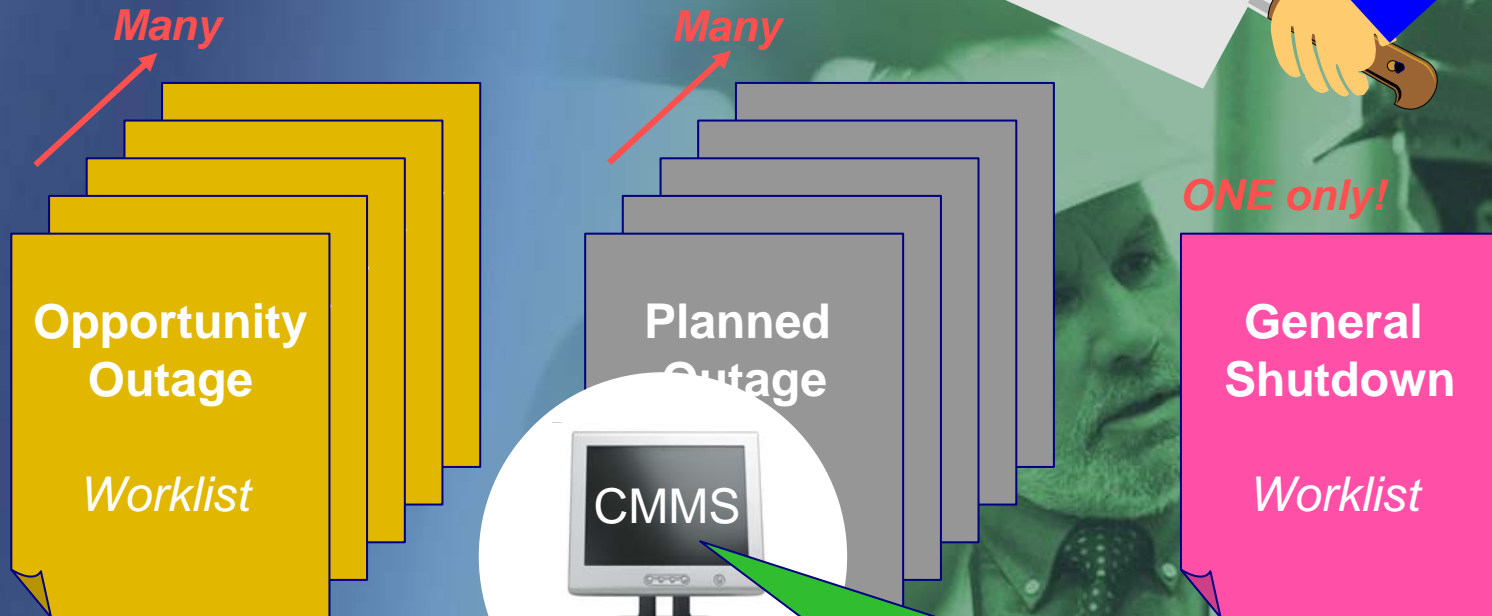


*ONE only!*



**The whole facility is down!** All power and services are off-line for inspection and maintenance. Generally every two years and, hopefully, never less than one. There is only one Worklist – and it's best kept as short as possible!

# Slicing & dicing – Outage Work Packages



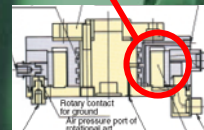
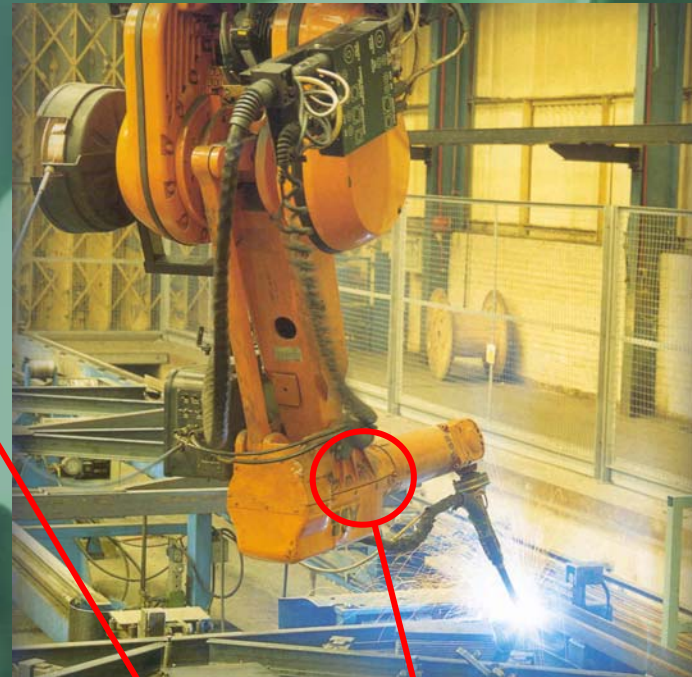
It's easy to set up, track and control as many Work Packages as you need in your CMMS. Such slick organisation and planning of downtime delivers maximum uptime and customer satisfaction



*Slicing and dicing Asset Management Data*  
**Preventive Maintenance Tasks**

# Slicing & dicing - Preventive Maintenance tasks

The need for Maintenance originates at an Asset's 'component' level – the failure of a single component Part can lead to consequences varying from trivial to major...



Rotary contact for ground  
All pressure part of rotational air



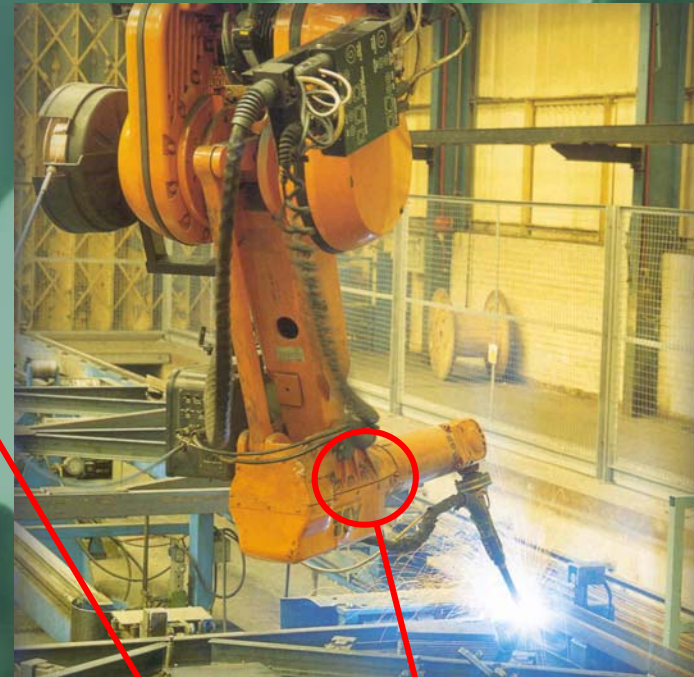
*robot wrist*

# Slicing & dicing - Preventive Maintenance tasks

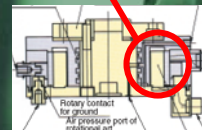
The need for Maintenance originates at an Asset's 'component' level – the failure of a single component Part can lead to consequences varying from trivial to major... *sometimes catastrophic in the case of an Asset system with high stored energy*



*Pressure  
Chemical  
Electrical  
Inertia*

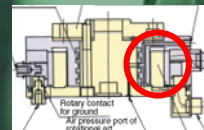
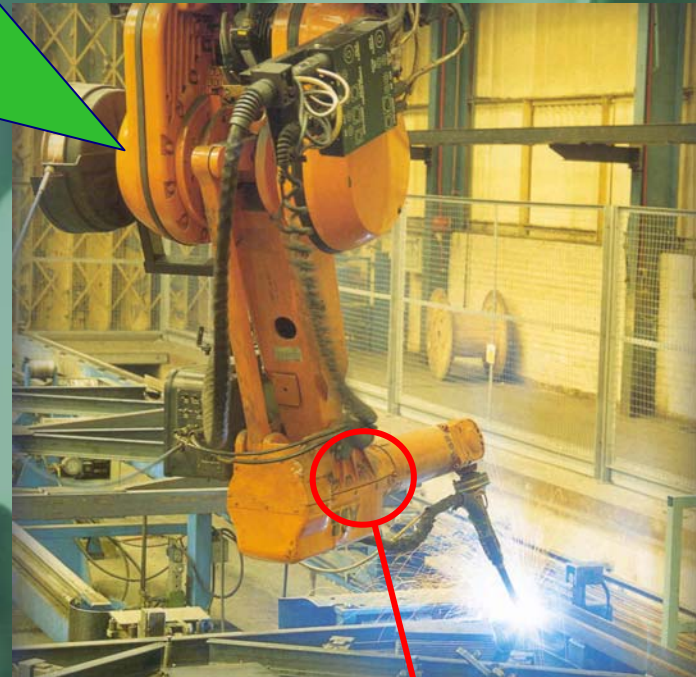


*robot wrist*



# Slicing & dicing - Preventive Maintenance tasks

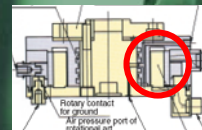
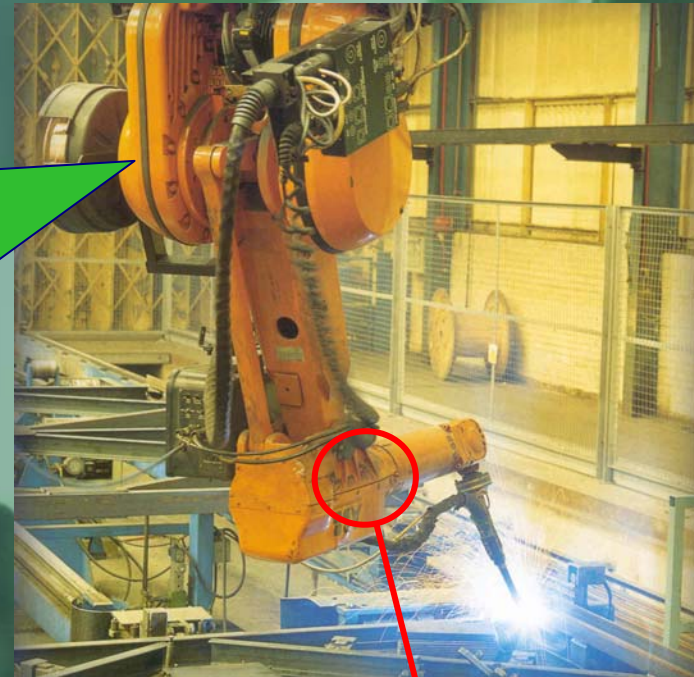
Each significant Asset should have a Maintenance Plan of Essential Care and Preventive Maintenance Tasks to preserve it in acceptable condition and counter unacceptable in-service failure. The Preventive Maintenance Tasks are targeted at the Asset's specifically identified, failure-prone component Parts



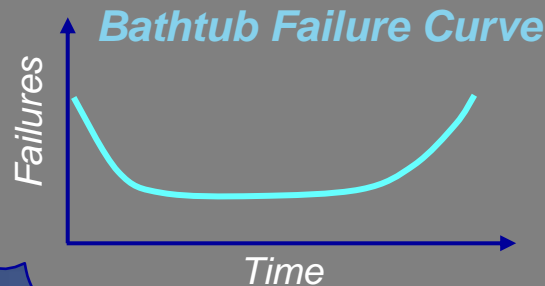
*robot wrist*

# Slicing & dicing - Preventive Maintenance tasks

Failure-prone Parts have different useful lives and predictable modes of failure. These dictate the type of and the time intervals between the periodic Preventive Maintenance interventions – that is, the PM Tasks and Task Frequency

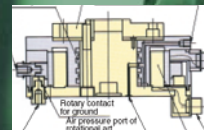
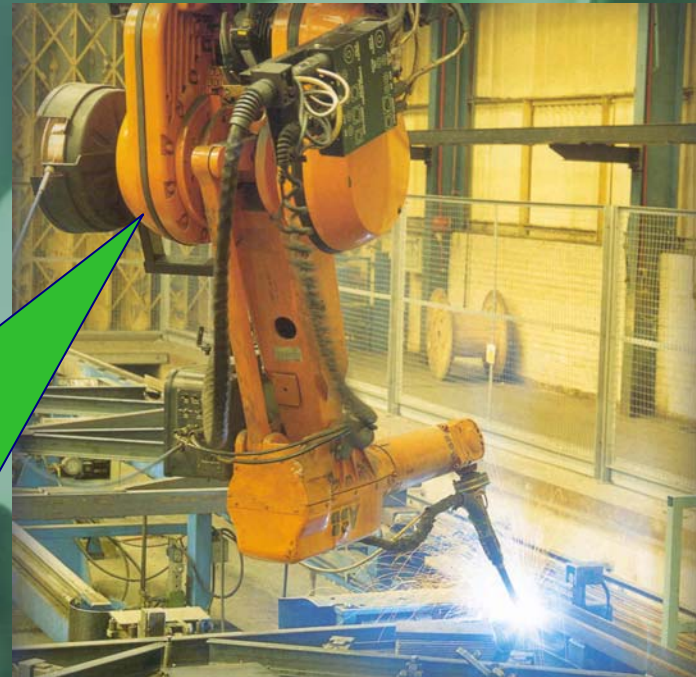


robot wrist



# Slicing & dicing - Preventive Maintenance tasks

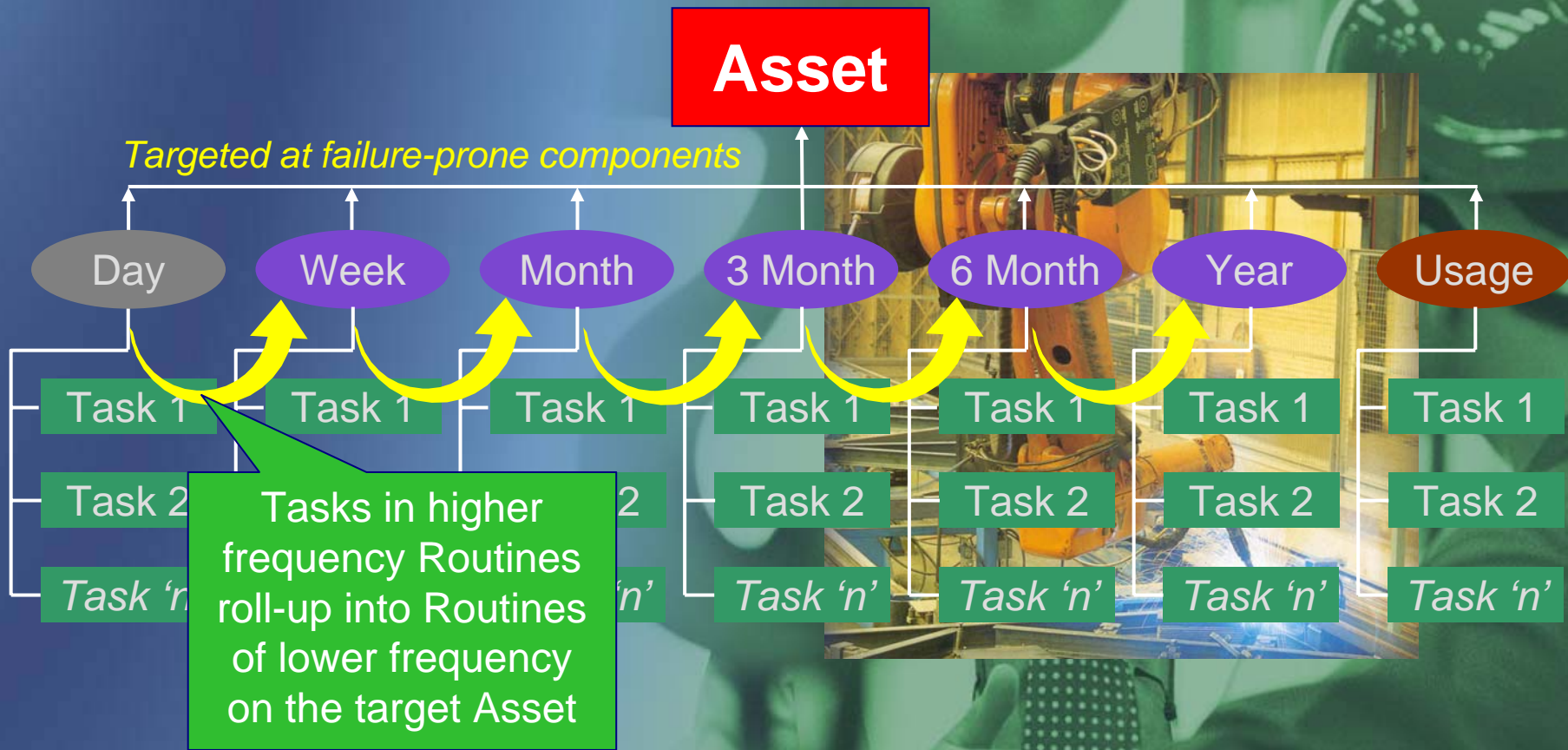
Tasks with the same frequency of application are grouped into PM Routines. For administration convenience, Routines are usually based on simple calendar intervals – day, week, month, etc. However, a Preventive Maintenance Optimisation initiative can result in other odd intervals



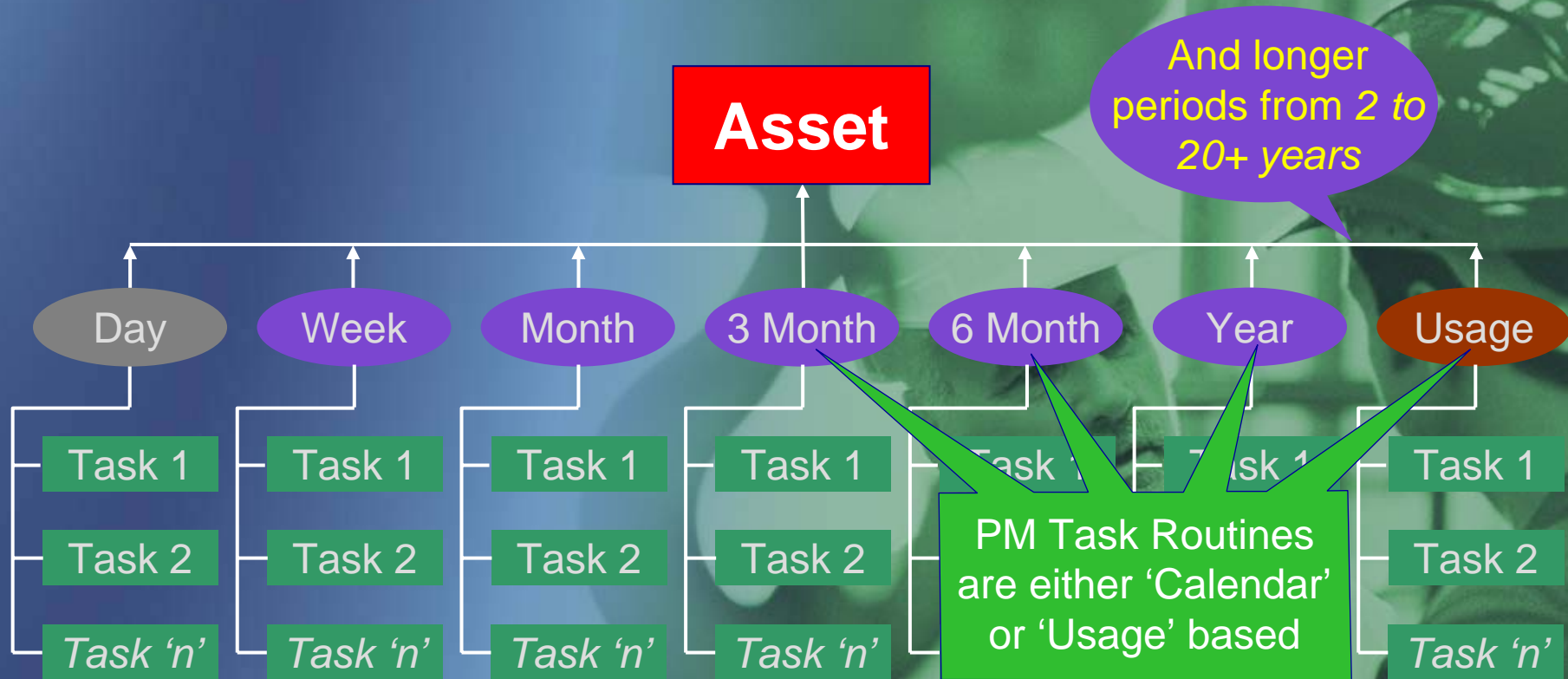
*robot wrist*



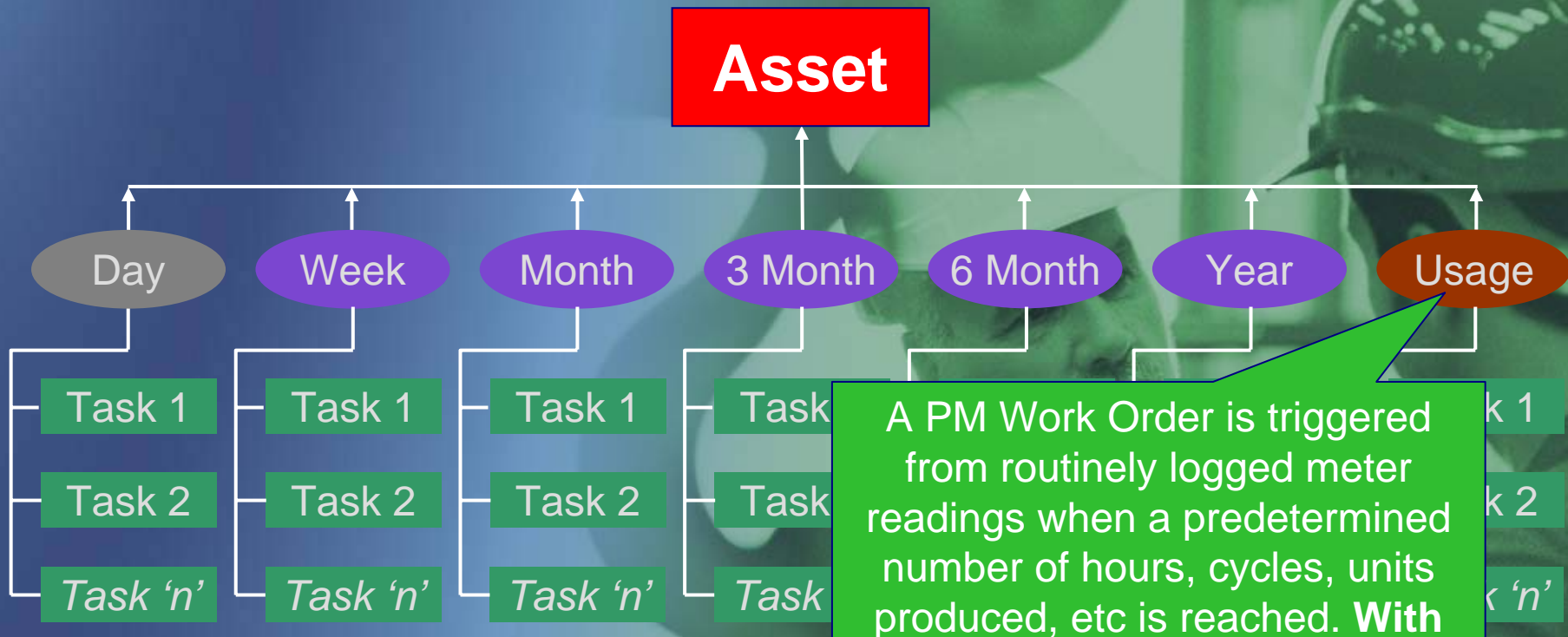
# Slicing & dicing - Preventive Maintenance tasks



# Slicing & dicing - Preventive Maintenance tasks



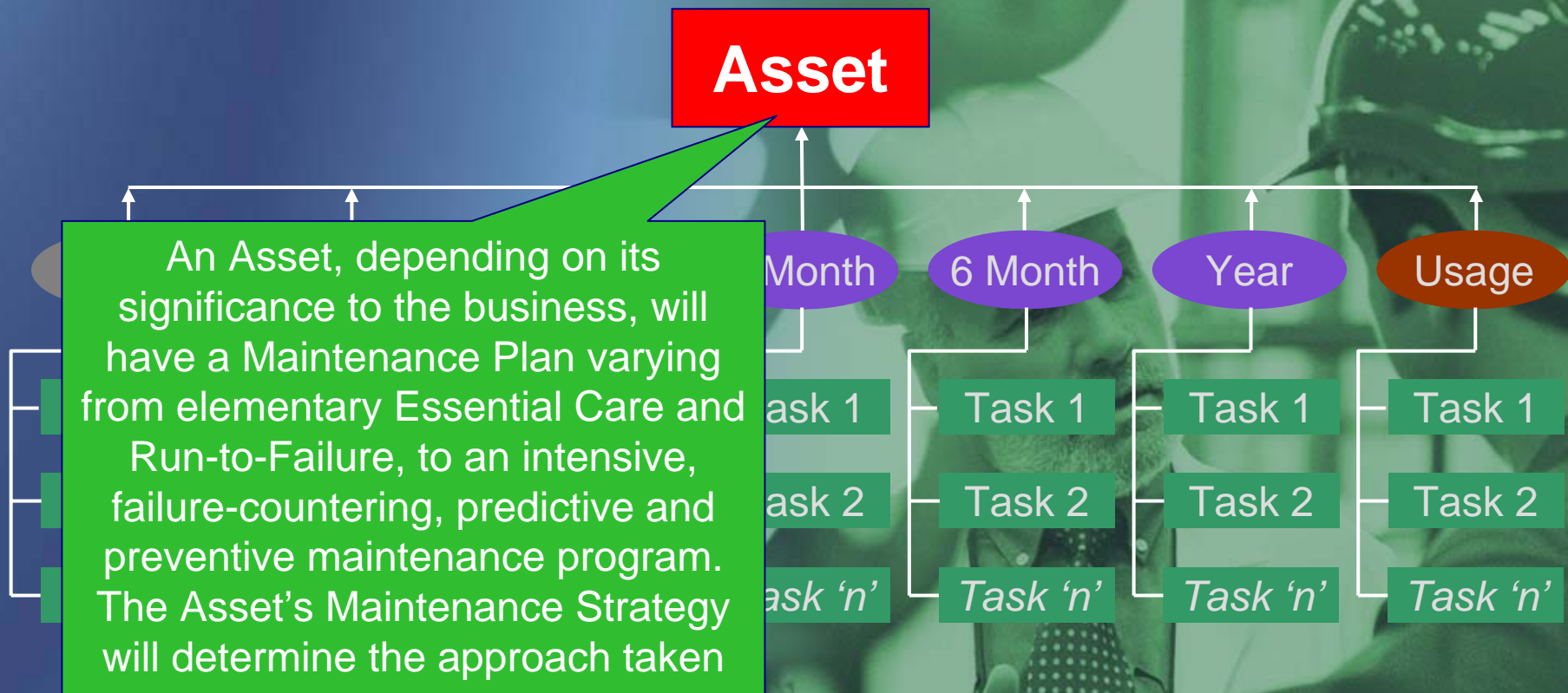
# Slicing & dicing - Preventive Maintenance tasks



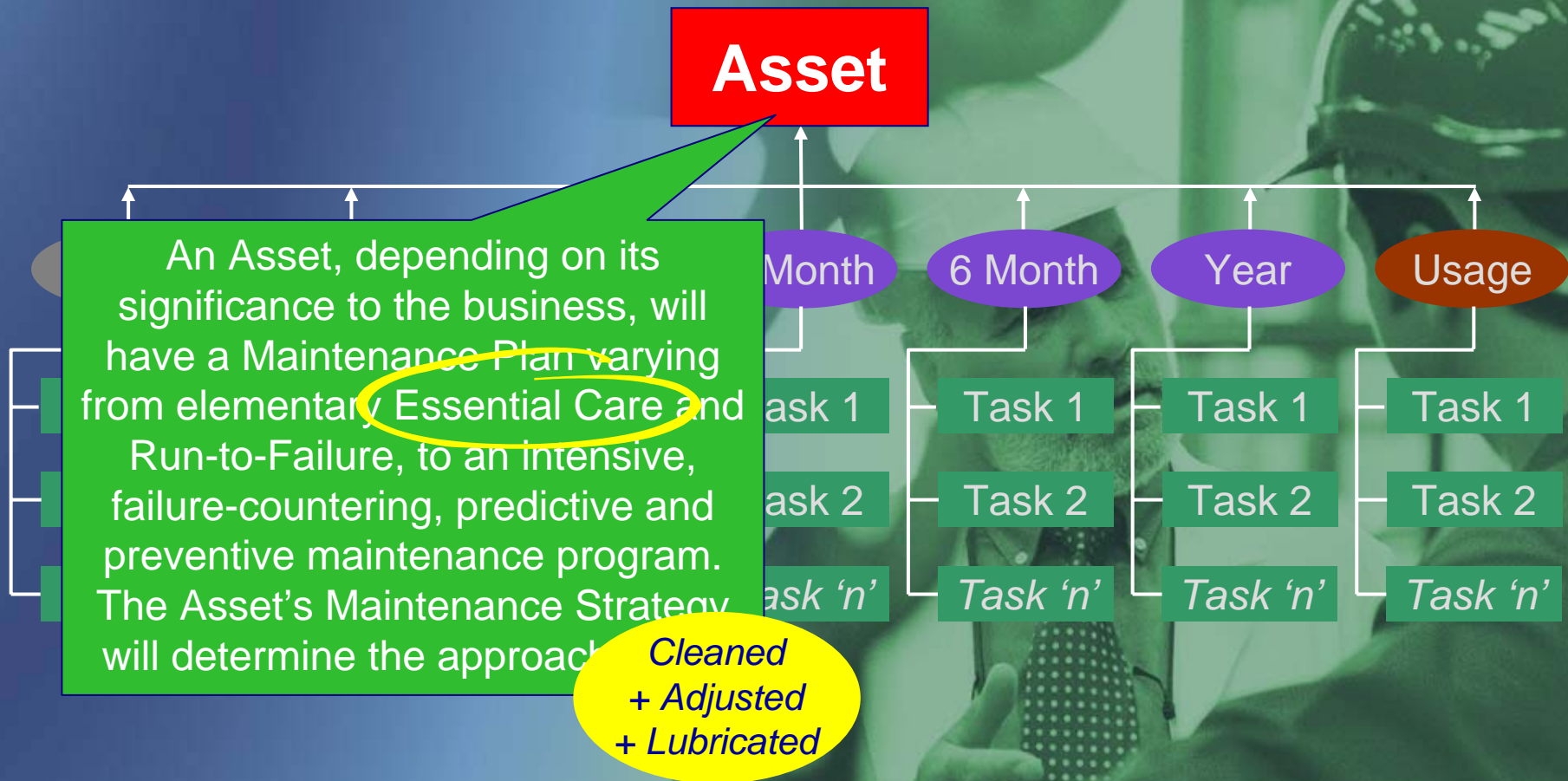
A PM Work Order is triggered from routinely logged meter readings when a predetermined number of hours, cycles, units produced, etc is reached. **With CMMS, the PM Work Order can be issued automatically**



# Slicing & dicing - Preventive Maintenance tasks

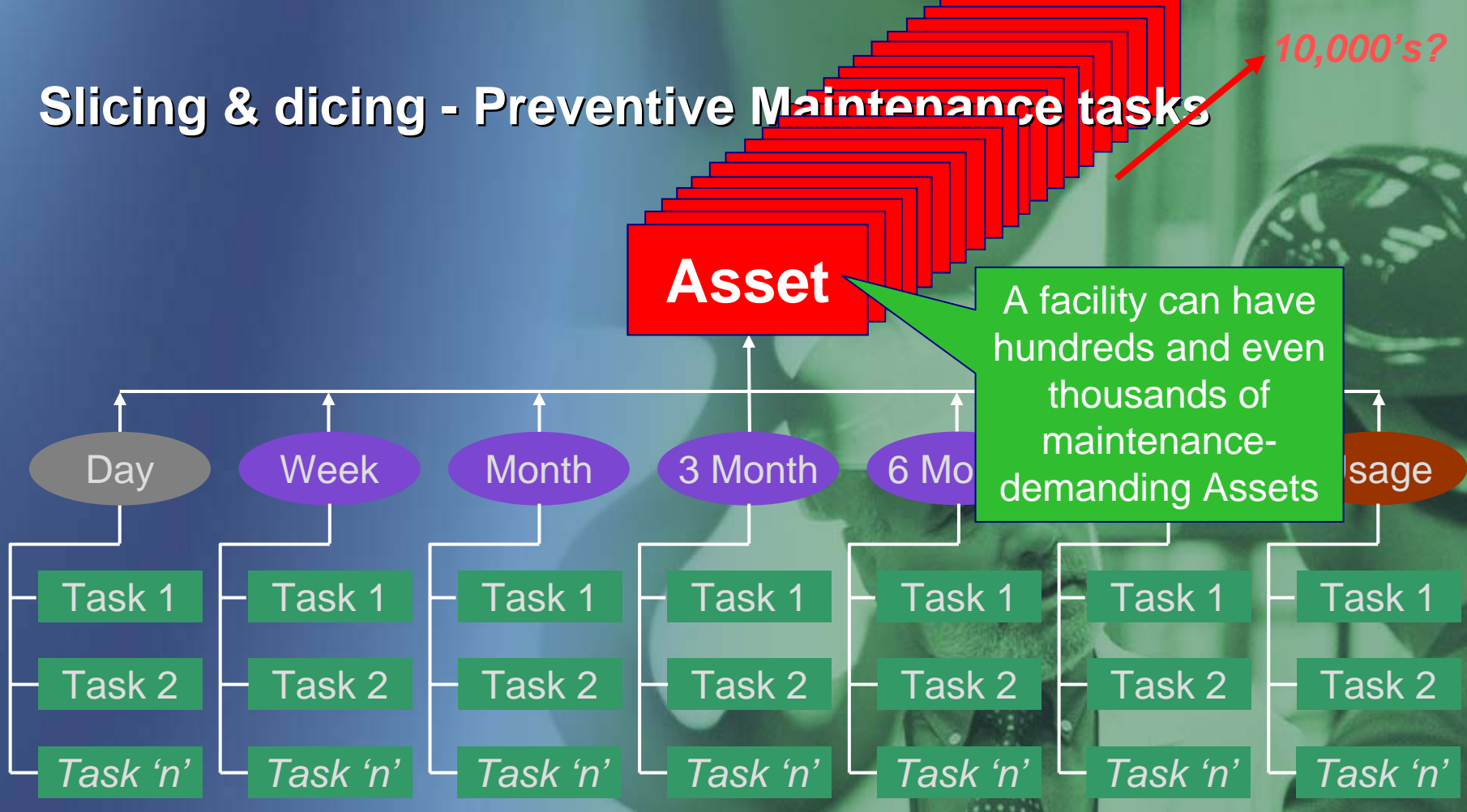


# Slicing & dicing - Preventive Maintenance tasks

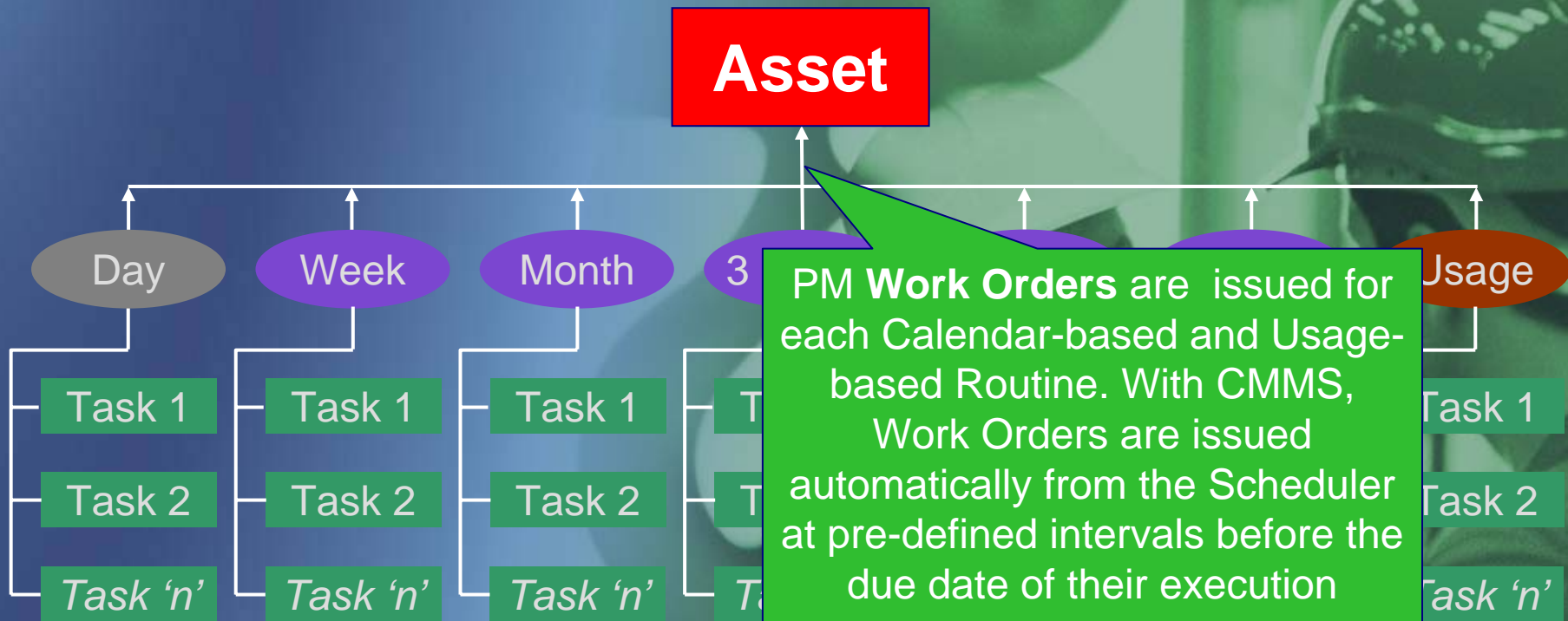


# Slicing & dicing - Preventive Maintenance tasks

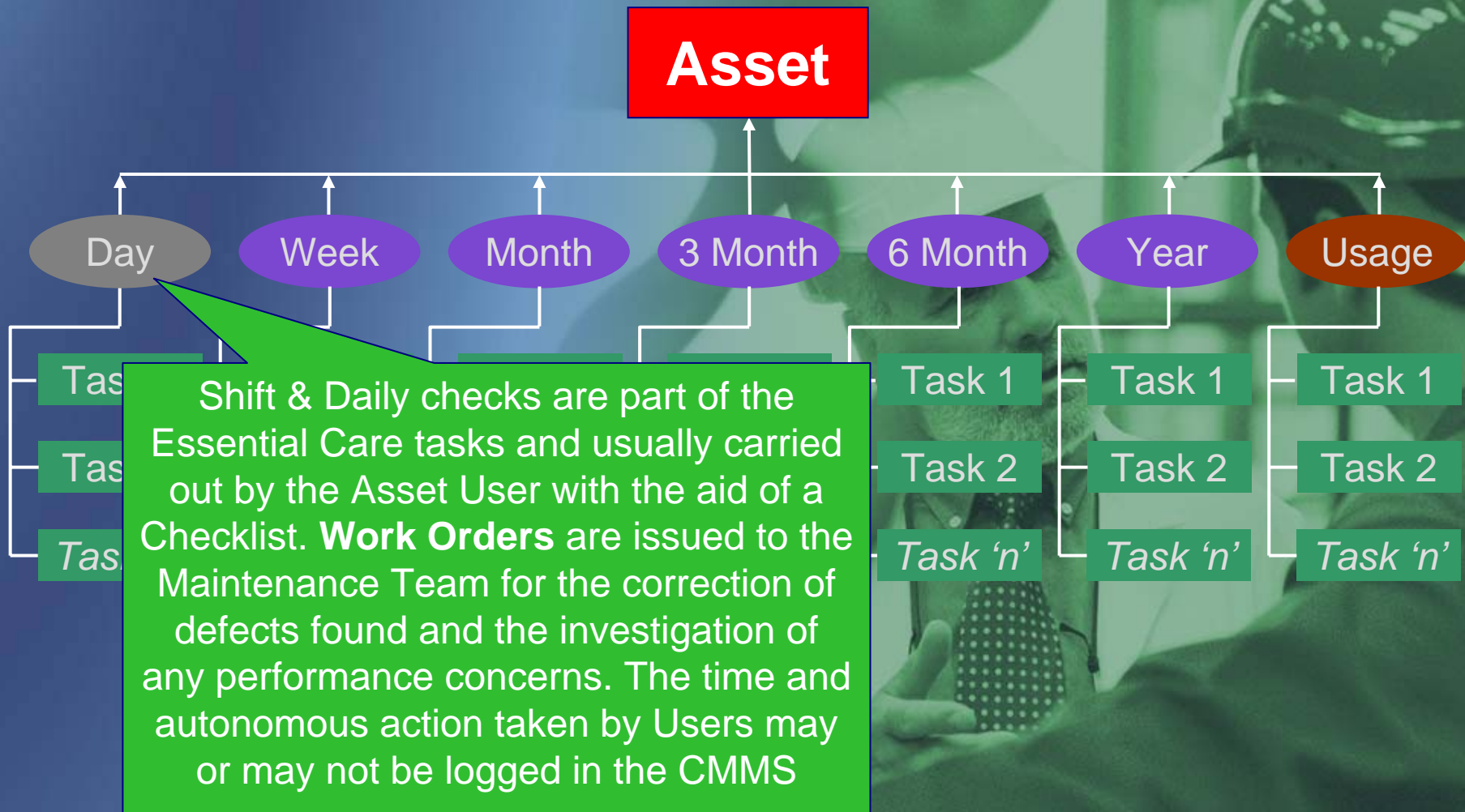
10,000's?



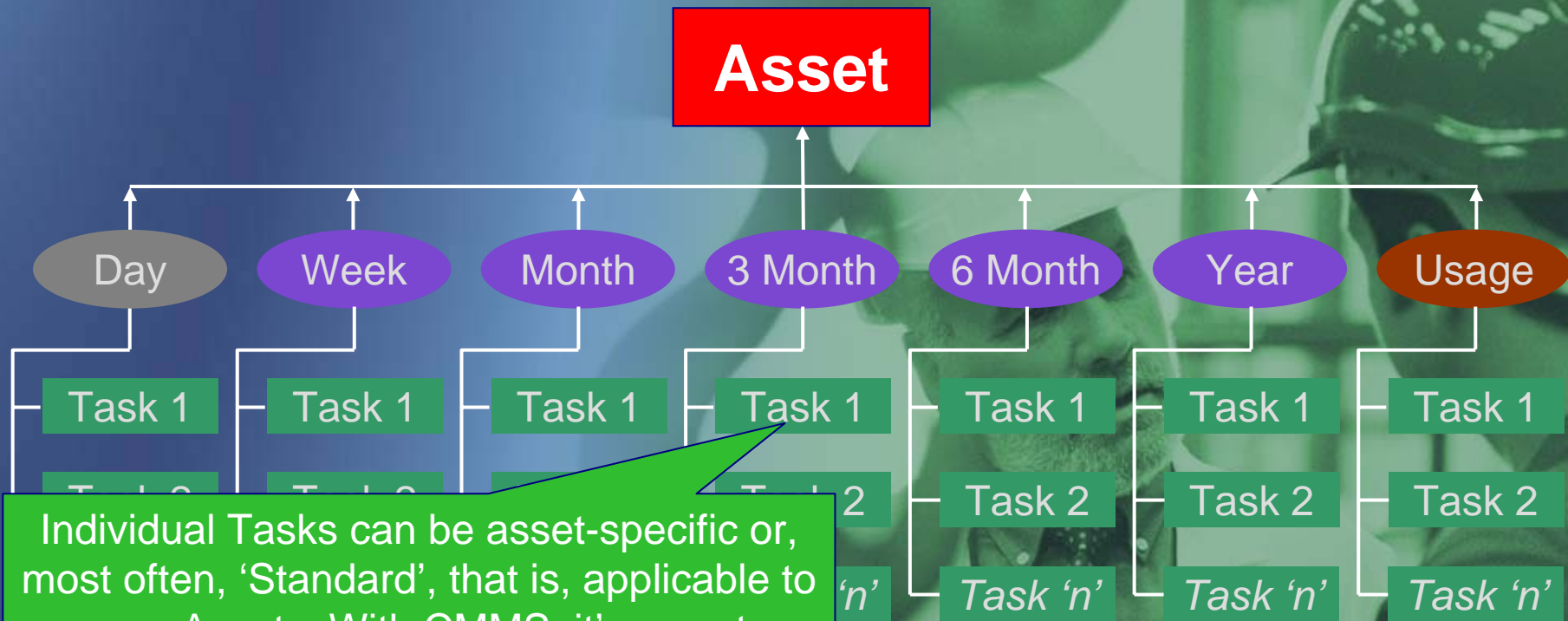
# Slicing & dicing - Preventive Maintenance tasks



# Slicing & dicing - Preventive Maintenance tasks



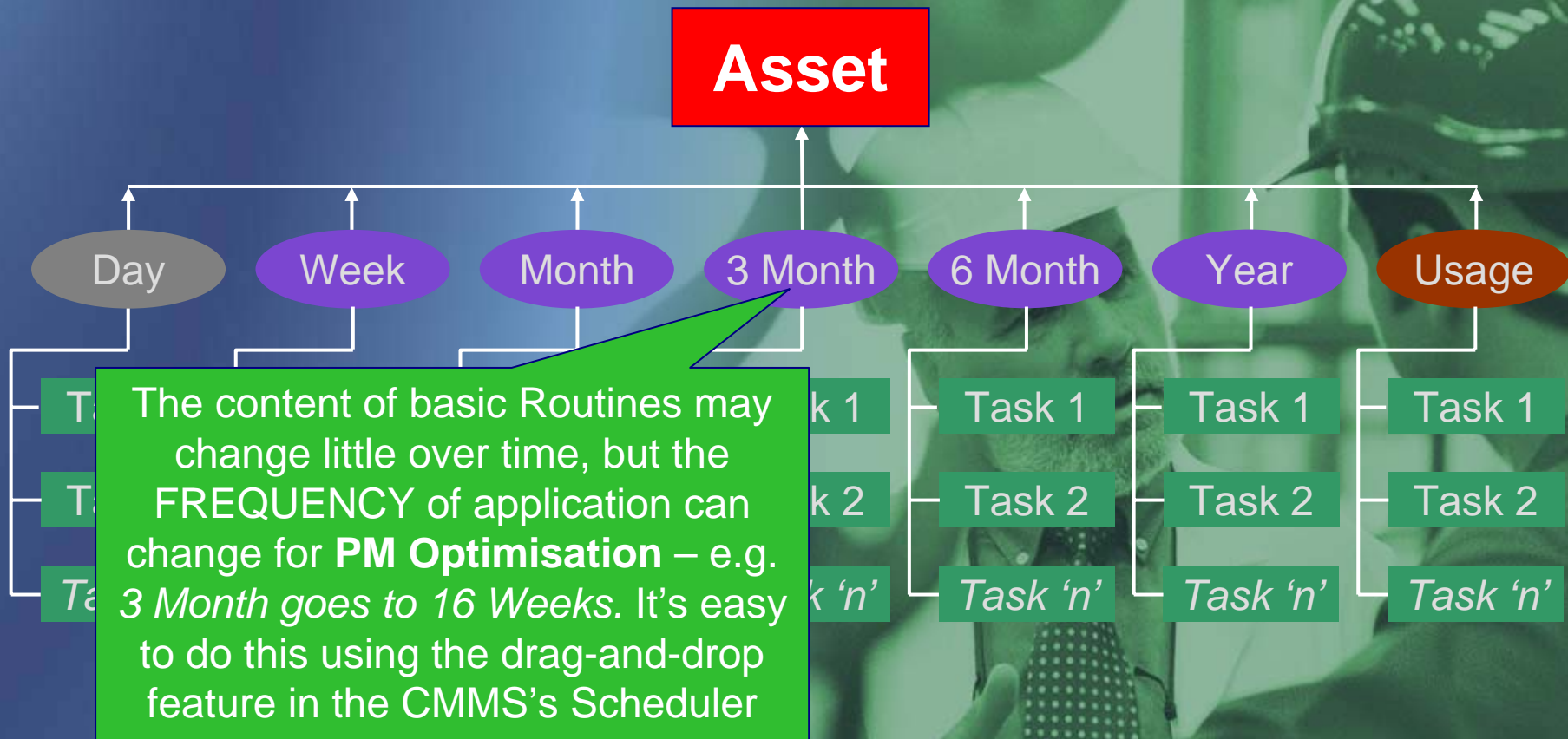
# Slicing & dicing - Preventive Maintenance tasks



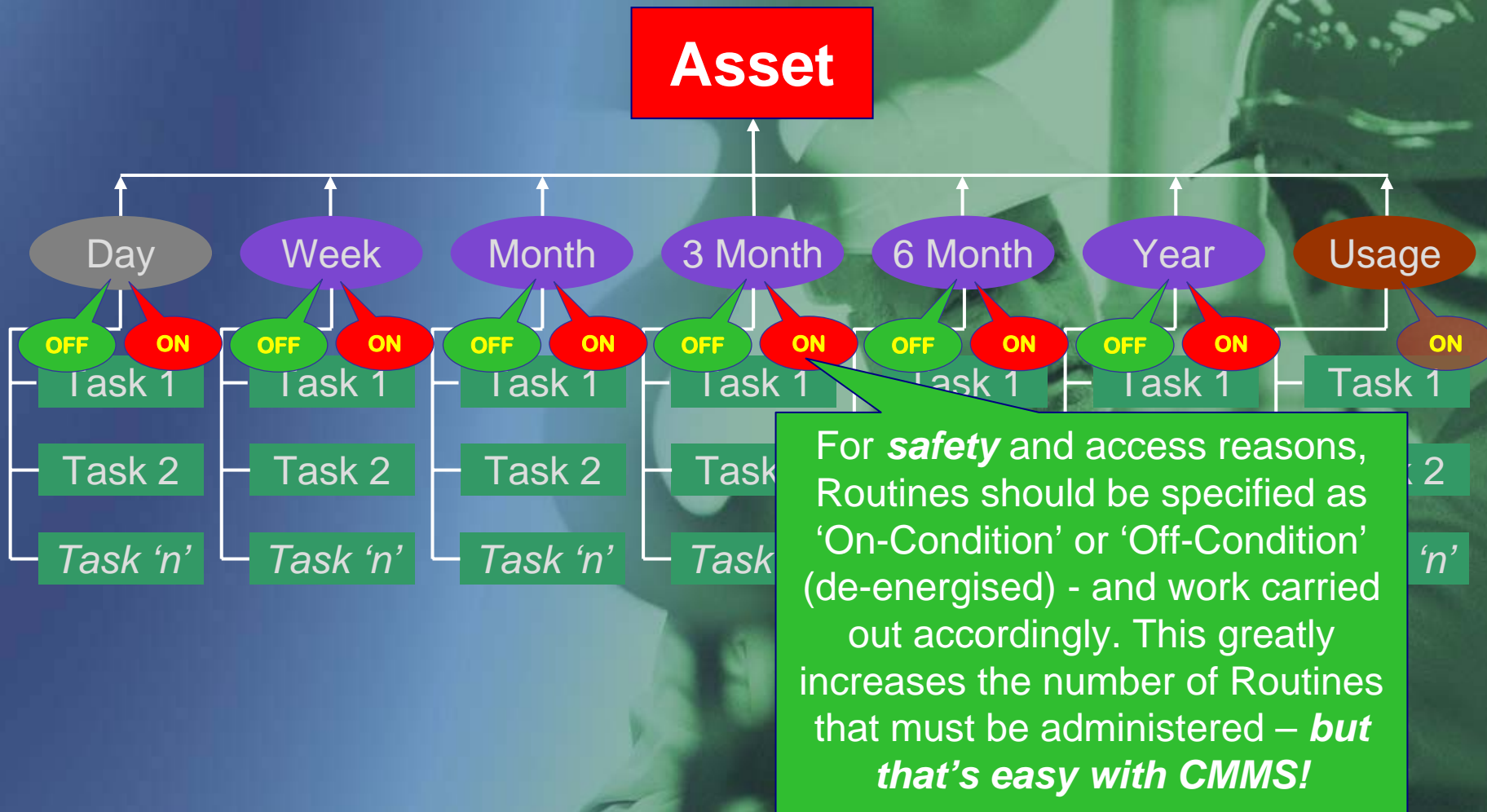
Individual Tasks can be asset-specific or, most often, 'Standard', that is, applicable to many Assets. With CMMS, it's easy to deploy Standard Tasks and 'clone' Routines. As a result, setting up the PM program for a facility is quick because of slashed admin and job standardisation



# Slicing & dicing - Preventive Maintenance tasks



# Slicing & dicing - Preventive Maintenance tasks



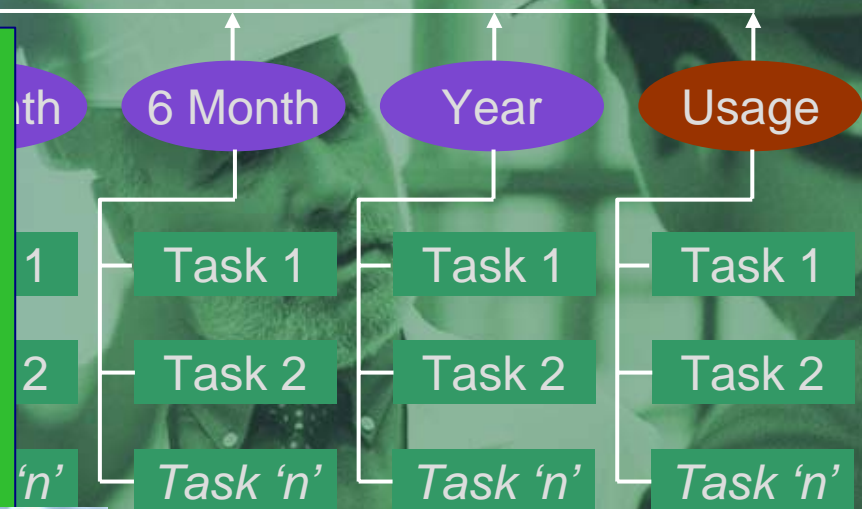




# Slicing & dicing - Preventive Maintenance tasks

**Asset**

In support of each Asset's technical and economic plan, the **Document Manager** in the CMMS also stores all applicable data sheets, specifications, drawings, standards, QA exhibits, warranties, O&M Manuals, images (*real, thermal, acoustic*), parts lists, etc, etc. With CMMS, ALL information is integrated, under change control and every detail is just a few clicks away!

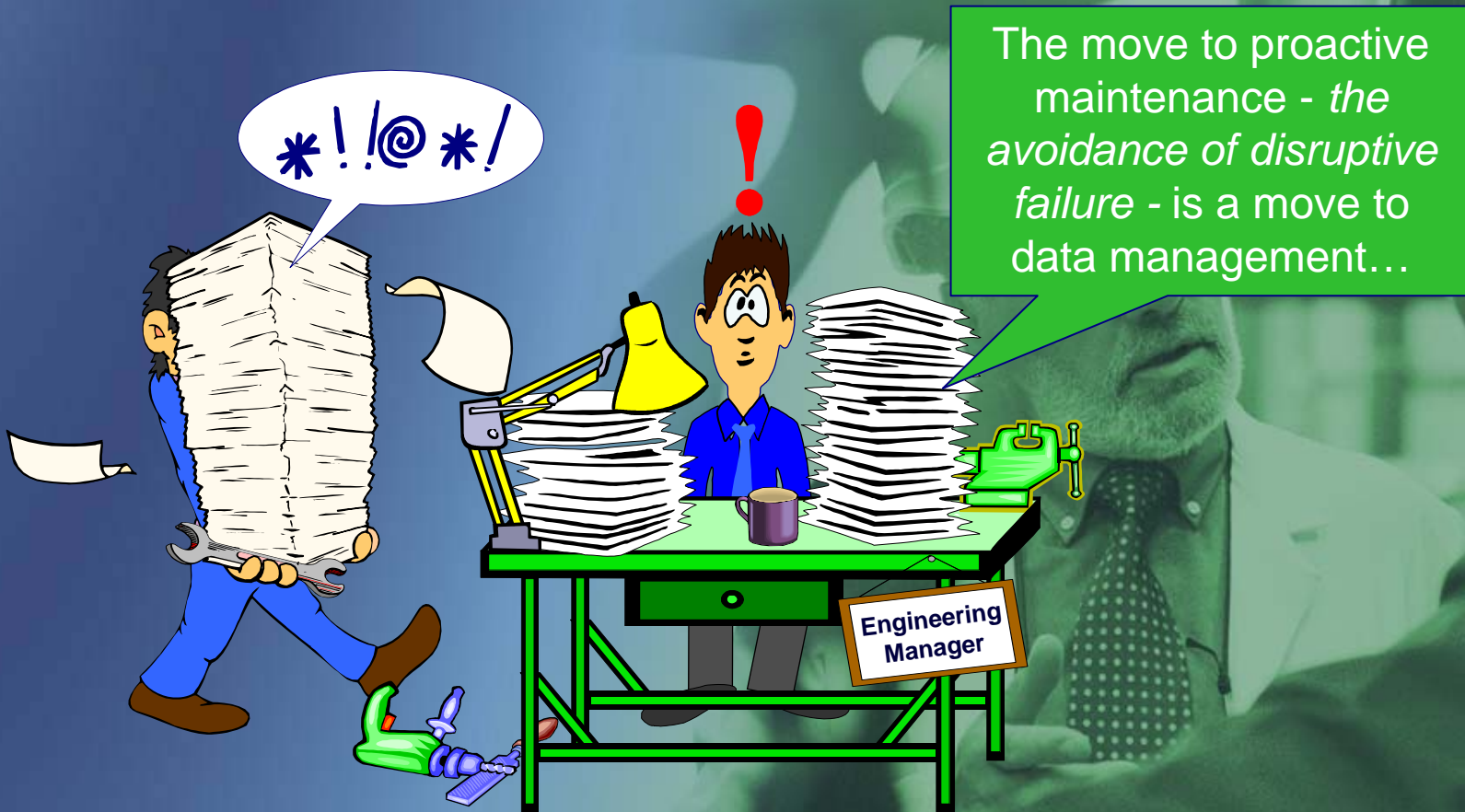




**Finally...**

# Proactive maintenance is data-driven

*It's 90% information & 10% engineering...*



# Proactive maintenance is data-driven

*It's 90% information & 10% engineering...*



# Proactive maintenance is data-driven

*It's 90% information & 10% engineering...*



# Proactive maintenance is data-driven

*It's 90% information & 10% engineering...*

With a CMMS, all information on asset technical, work & failure history and the forward work plan are in a central database - and can be shared easily with everybody who needs to know

*...details are just a few clicks away!*



# Some CMMS cautions

- Make sure the asset work and failure history details you keep are accurate and useable - fit for present and, ideally, future purpose, because *longer term needs will undoubtedly have current data collection requirements*
- So, do ensure the information you historise is sliced and diced, so as to be able to give up its inner secrets when you eventually get to query it
- The devil is in the detail, so there must be sufficient granularity in the basic data to answer all those future questions you will undoubtedly have at some point down the road
- You ignore garage-in-garbage-out counselling at your peril. Just as piling up large inventories of products is poor practice and uncompetitive, the same is true for information – especially when you're piling up garbage in the mistaken belief that it's valuable



# Thank you

*And remember... the Engineering Manager has to lead the way for all things maintenance to happen*