



MAINTENANCE WORKFLOW FUNDAMENTALS

ROSEN

Gary Knight · NEPIC Best Practice in Industrial Asset Management · 21st November 2018

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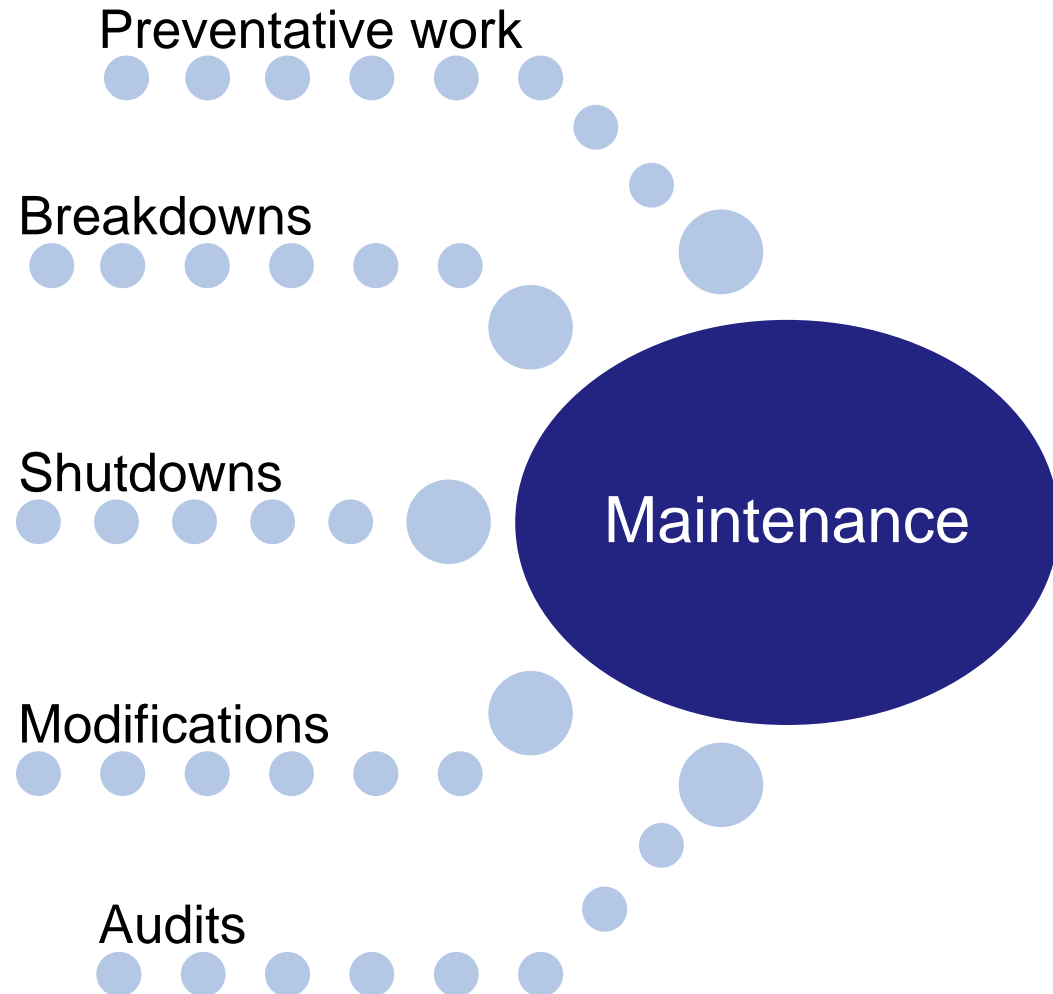
1. Introduction
2. Computerised Solutions
3. The People
4. The Equipment
5. Maintenance Workflow
6. Roles & Responsibilities
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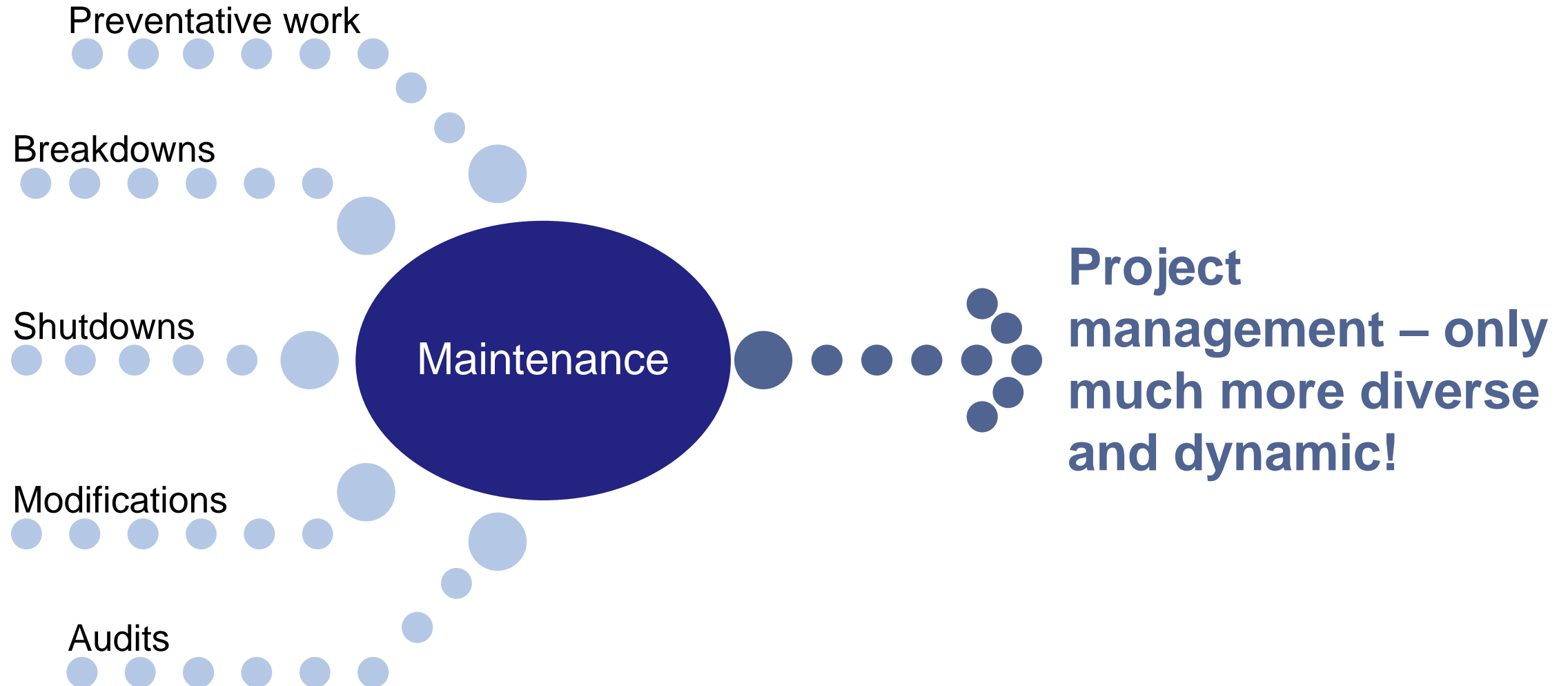
INTRODUCTION

WHAT IS MAINTENANCE EXECUTION?



INTRODUCTION

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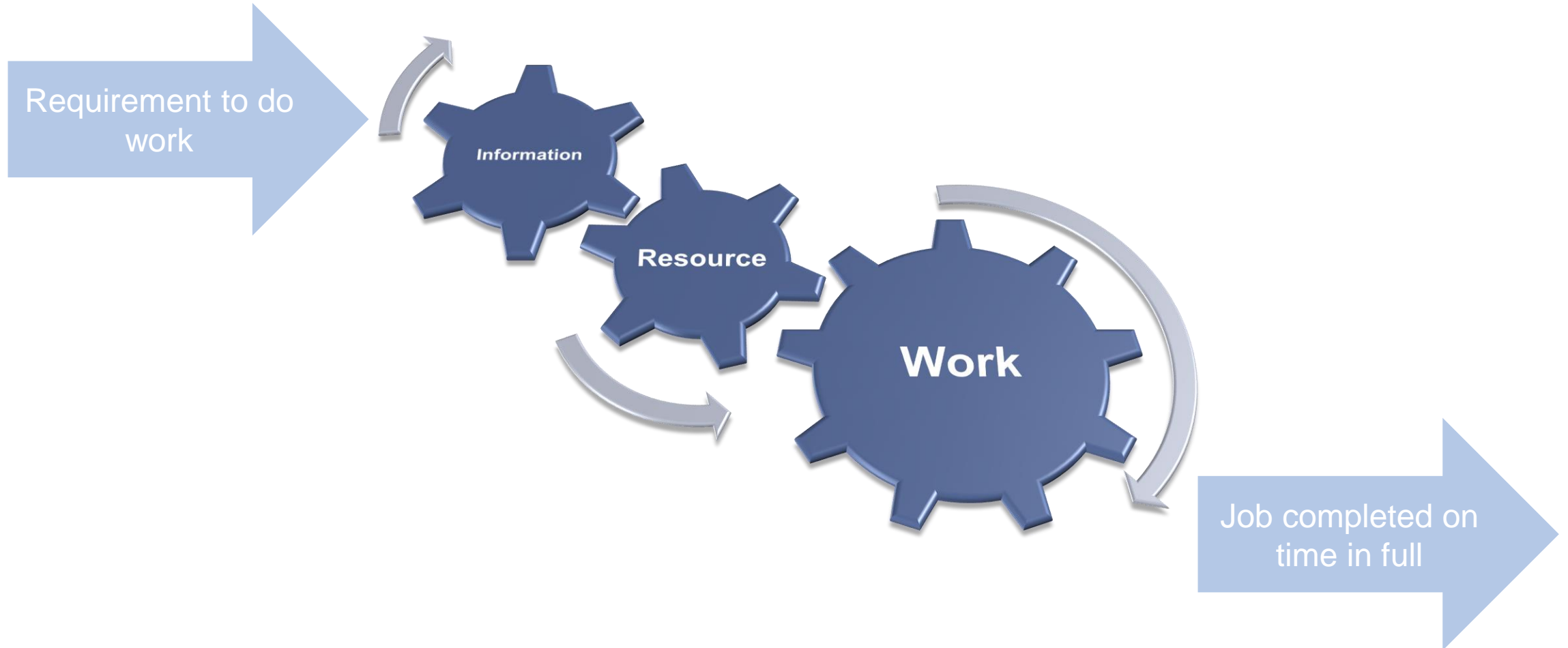


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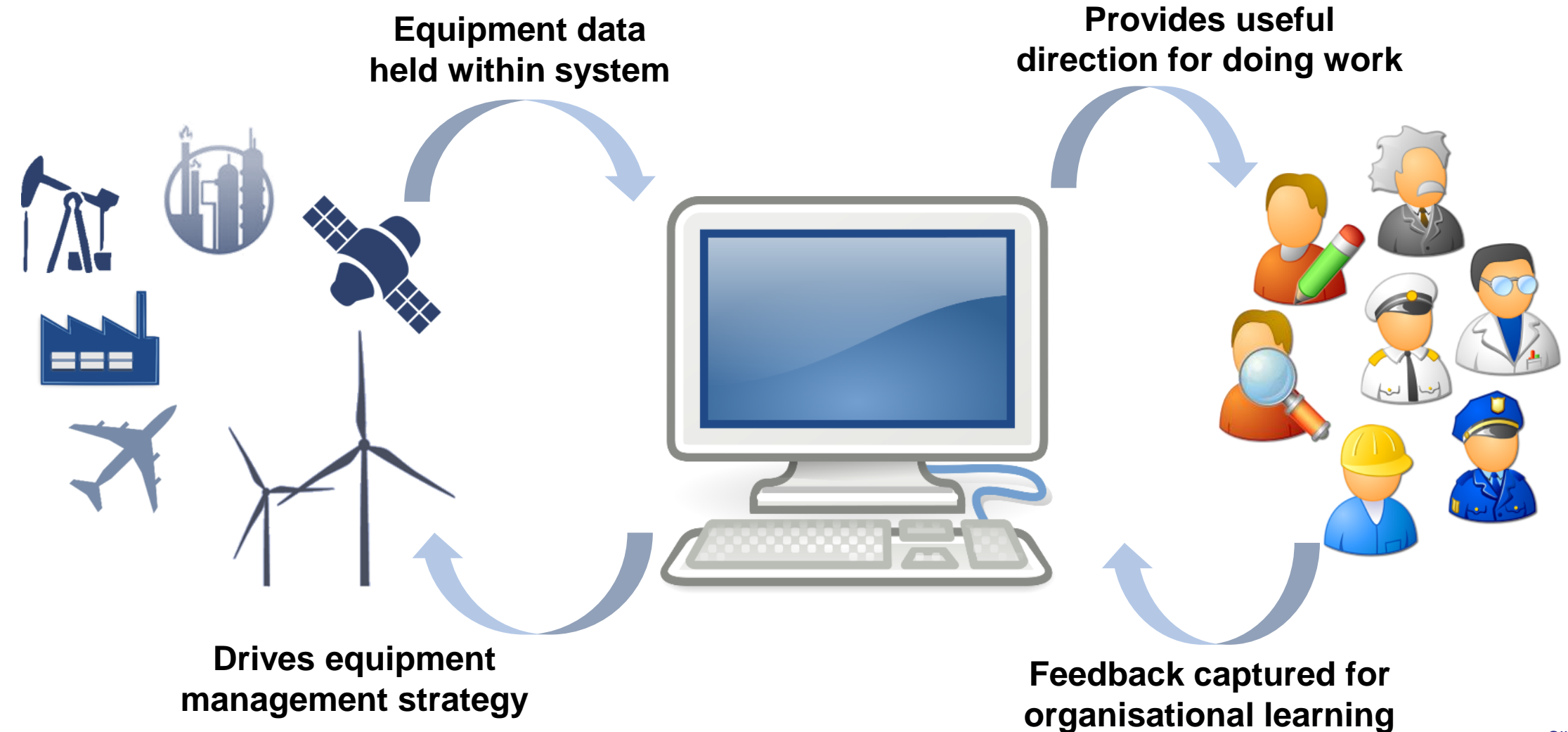
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COMPUTERISED SOLUTIONS

HOW THEY MAY BE PERCEIVED



COMPUTERISED SOLUTIONS WHAT GOOD LOOKS LIKE



COMPUTERISED SOLUTIONS BUT WITHOUT INTEGRATION...



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THE PEOPLE STAKEHOLDERS NEEDS

The people who are personally invested in the performance of the system, and have some power over what the system is



ORGANISATIONAL MANAGEMENT – Need to know that all required work is identified and is being carried out effectively



ACCOUNTS/FINANCE – Financial resources are being efficiently deployed, expenditure meets expected budgets

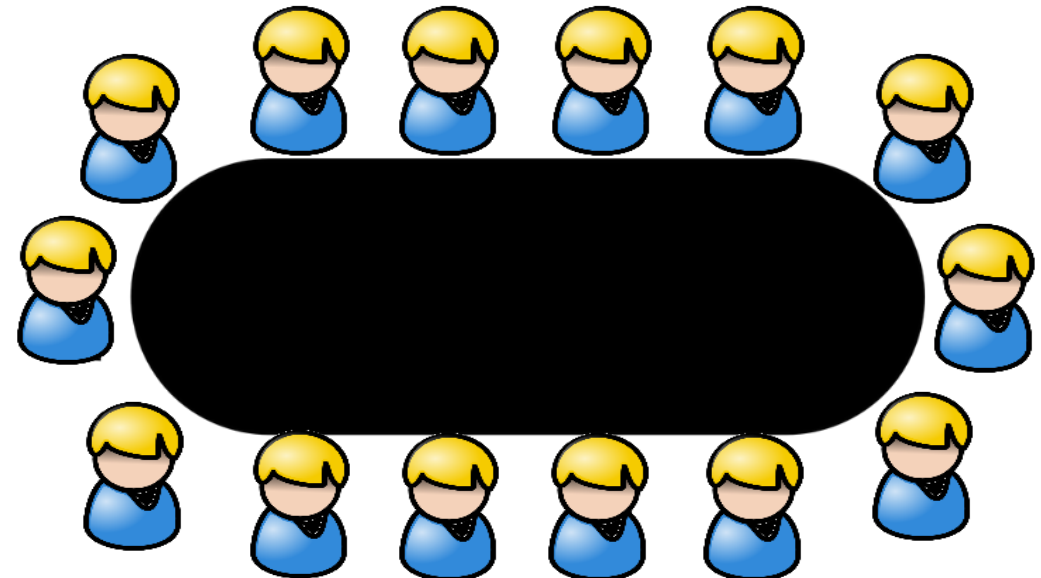


AUDITORS – Assurance of compliance with systems and standards. Internal and third party.



REGULATORS – Ensuring the protection of the public and the environment via compliance with regulation

BOARD OF DIRECTORS



Are investor interests, both legal and financial, being met?

THE PEOPLE STAKEHOLDERS NEEDS

Different people within the organisation have different needs



ORGANISATION MANAGEMENT – Need to know that work is identified and is being done effectively

Information



ACCOUNTS/FINANCE – Financial resources are being efficiently deployed, expenditure meets expected budgets



AUDITORS – Compliance with systems and standards. Internal and third party.

Data



REGULATORS – Ensuring the protection of the public and the environment via compliance with regulation

BOARD OF DIRECTORS



Are investor interests, both legal and financial, being met?

THE PEOPLE CONSTITUENT NEEDS

The people who have to work within the system every day, but have no major influence over what the system is



PLANT MANAGEMENT – Are we meeting our objectives?



MAINTENANCE MANAGEMENT – What work do I have in front of me?



ENGINEERING – Are the assets performing as expected?



TECHNICIANS – How do I do this job I have been assigned?



SUPERVISION – What performance standards does this work need to meet?

THE PEOPLE IDENTIFYING NEEDS

Stakeholder & constituent needs analysis	Interest				Fulfilment
	Safety, Health & Environment	Quality	Delivery	Cost	
Site director	Critical maintenance tasks completed on time in full	Maintenance tasks delivering required performance	Maintenance tasks delivered within expected timeframes	Maintenance being delivered within budget	Accurate monthly KPI dashboard to be generated - not interested in source
Plant manager	Which tasks are critical Work is being executed according to safety standards	What are the performance standards	Maintenance tasks delivered within expected timeframes	Spend to date within period Forecast to end of period	Critical tasks flagged in system Safety & performance standards referenced in work instructions Estimates of work durations Current spend Estimated future spend
Maintenance manager	Which tasks are critical Inputs to meet safety standards	Inputs to meet performance standards	What jobs do I need to do first? Resource availability	Work completed within current period Work outstanding to end of period Arising work rate	Critical tasks flagged in system Safety & performance standards are complete Workload prioritisation Resource schedule Completion reports Backlog reports Ability to identify different types of work
Technician	What safety precautions do I need to take?	What performance standards do I need to meet, and how do I meet them?	How long should this job take? What needs to be in place before I start?	How much material should I be using?	Safety procedure and preventative measures listed Technical specifications, parameters and settings Task duration estimate Materials requirements

BUILDING OUR SYSTEM

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THE EQUIPMENT HAVE YOU CONSIDERED?

- Why is the equipment there?
- Who is interested in its performance?
- What are its characteristics?
- Where did we get it from?
- How long has it been installed?
- Do we need to carry spares?
- What maintenance does it need?
- What other equipment or systems is it associated with?

➤ **What do you need to know? Where do you store this critical information?**

THE EQUIPMENT STANDARDISE EQUIPMENT DATA

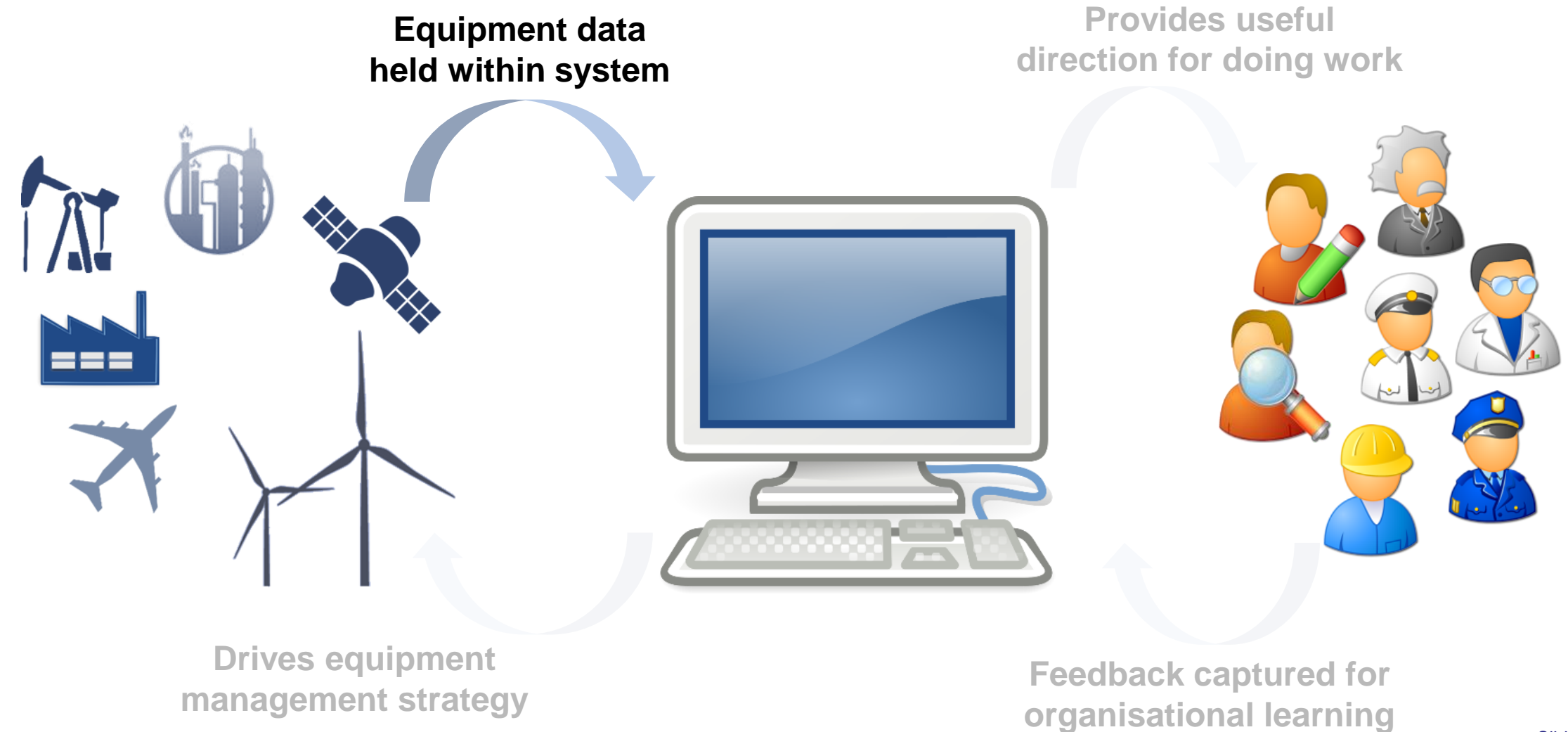
Organisational data	
Unique identifier:	
Description:	
Site:	
Plant:	
Section:	
Location:	
Maintenance data	
Work centre:	
Planner group:	
Maintainable item:	
Manufacturer data	
Model:	
Serial No.:	
Year of manufacture:	
Equipment data	
Equipment type:	
Characteristic classes:	
Criticality:	
Installation date:	
BOM reference:	

Ensure data consistency within the system using forms

- Automated upload forms
- Procedural control

Match metadata mandatory fields to stakeholder and constituent needs

BUILDING OUR SYSTEM

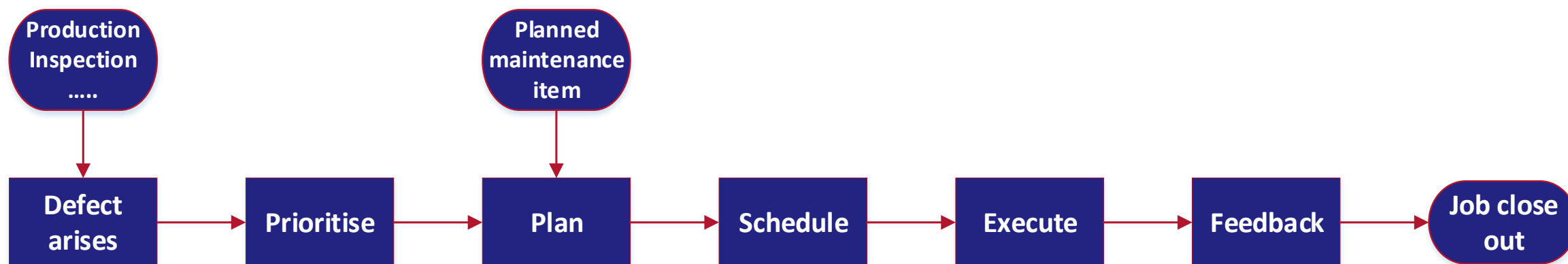


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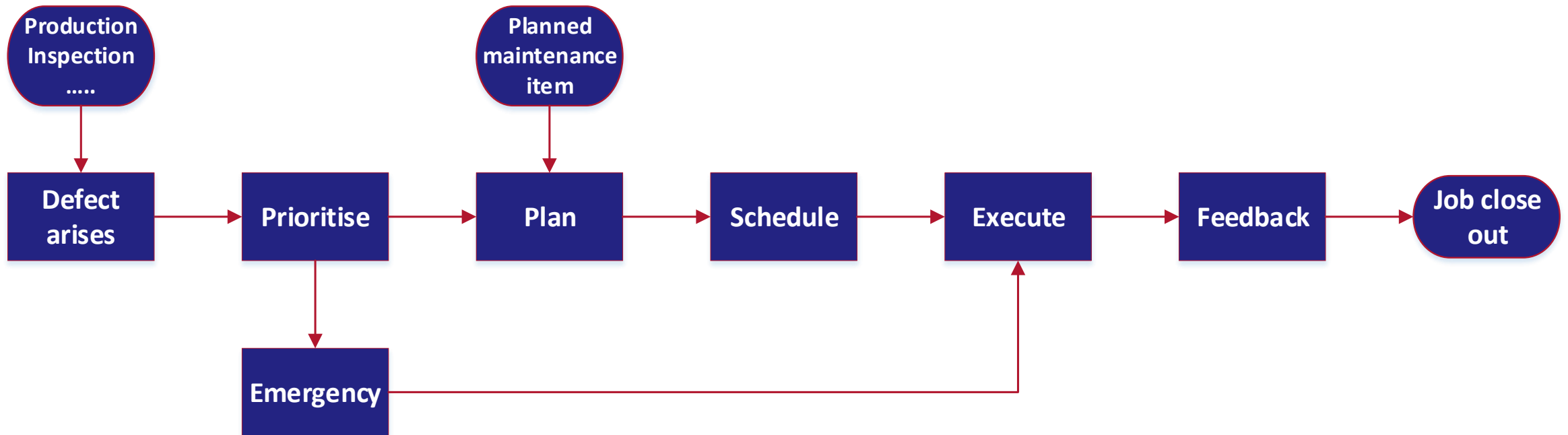
THE BASIC WORKFLOW PROCESS

WORK EXECUTION



THE BASIC WORKFLOW PROCESS

WORK EXECUTION

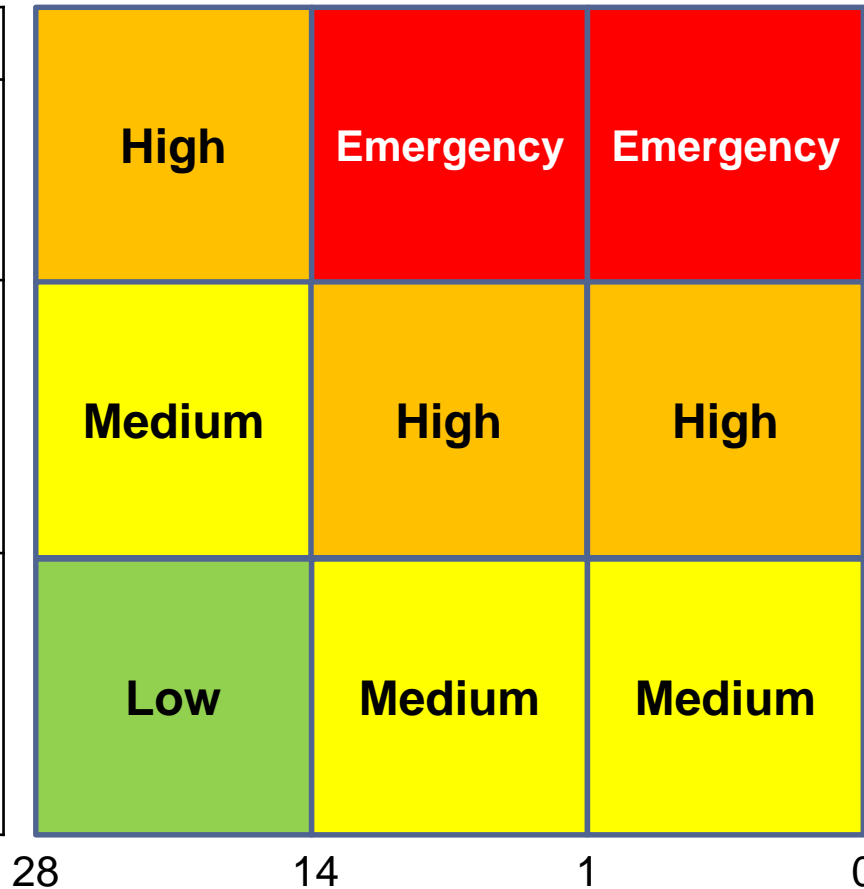


THE BASIC WORKFLOW PROCESS

PRIORITISE – TASK IMPORTANCE

Consequence

Safety	Environment	Production
Unacceptable risk of injury	Release of hazardous fluids outside of containment	Plant shut down
Safety concern - short term risk mitigation in place	Release of hazardous fluids within secondary containment	Plant rate impaired > 0%, <50%
Safety concern - long term risk mitigation in place	Release of hazardous fluids – mitigation in place	Plant rate impaired > 50%, < 100%



Planning horizon

Emergency – immediate response

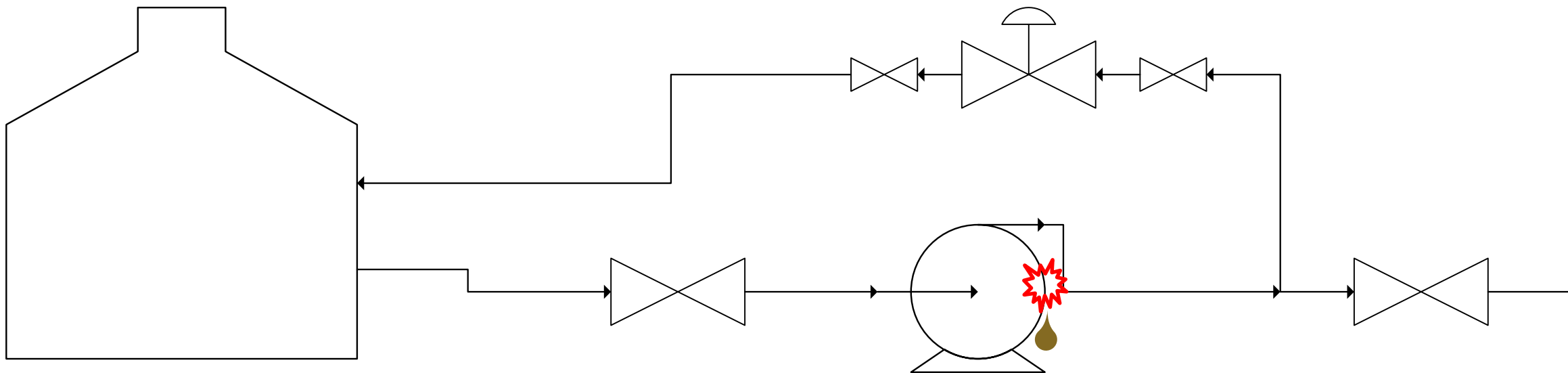
High – as soon as practically possible

Medium – plan two to four weeks

Low – longer term planning, manage backlog

Impact horizon (days)

PRIORITISATION EXAMPLE



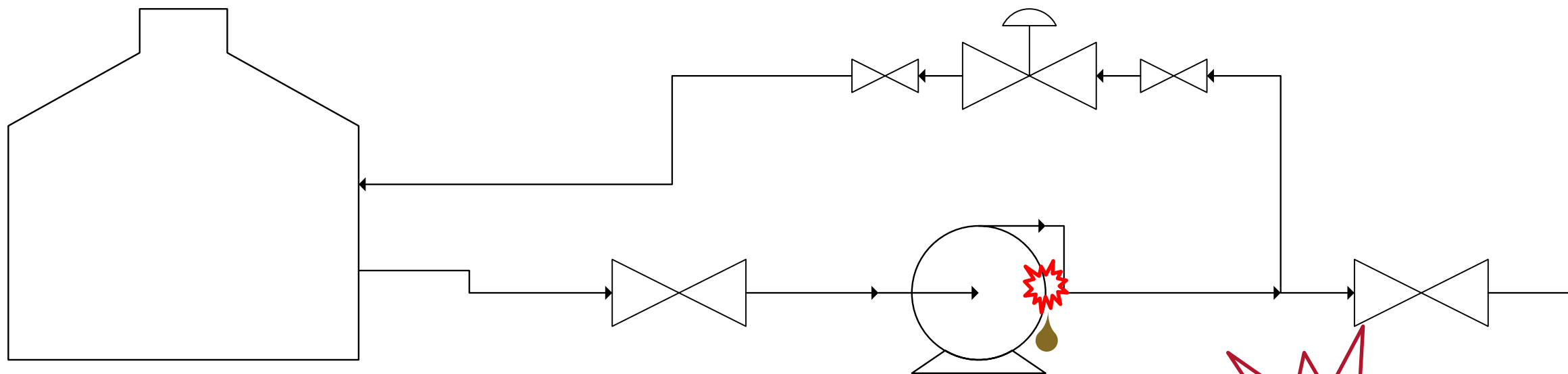
Export pump has developed a seal leak:

In bund, on hard standing

Hazardous fluid – toxic, non-flammable

Single pump, main process supply

PRIORITISATION EXAMPLE



Export pump has developed a seal leak:
In bund, on hard standing
Hazardous fluid – toxic, non-flammable
Single pump, main process supply

Safety	Environment	Production	
Unacceptable risk of injury	Release of hazardous fluids outside of containment	Plant shut down	High Emergency Emergency
Safety concern - short term risk mitigation in place	Release of hazardous fluids within secondary containment	Plant rate impaired > 0%, <50%	Medium High High
Safety concern - long term risk mitigation in place	Release of hazardous fluids – mitigation in place	Plant rate impaired > 50%, < 100%	Low Medium Medium
			28 14 1 0
			Impact horizon (days)

THE BASIC WORKFLOW PROCESS PLAN

- The identification of everything that is required to complete a task
 - Labour & skills
 - Equipment
 - Materials
 - Time
 - Preparations & isolations

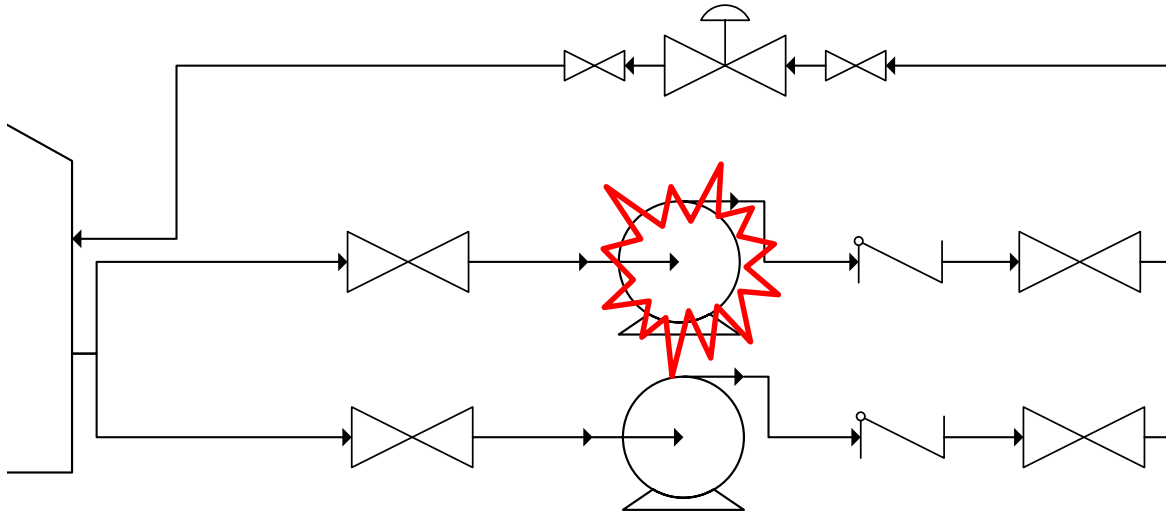
➤ Sometimes referred to as job stepping



Computers don't plan, people do!

THE BASIC WORKFLOW PROCESS

JOB STEPPING EXAMPLE



Step	Tools/eq.	Materials	Time	Who
Isolate & drain	Wheel dog	Lock set	30	Process tech
Fit spades	Standard	Spades	60	Maintenance tech
Withdraw spare pump	Forklift	Pump	30	Maintenance Co-ordinator
Remove pump	Crane	N/A	30	Maintenance tech
Land new pump	Crane	Gaskets & bolts	30	Maintenance tech
Align pump	Rotalign	N/A	30	Maintenance tech
Remove spades	Standard	Gaskets	30	Maintenance tech
Put into hot standby	Wheel dog	N/A	15	Process tech
Send pump for repair	Forklift	N/A	N/A	Maintenance Co-ordinator

Job stepping

1. Walk through major steps to complete task
2. Identify tooling, equipment and materials for each step
3. Estimate time to complete each step
4. Identify who will do each step

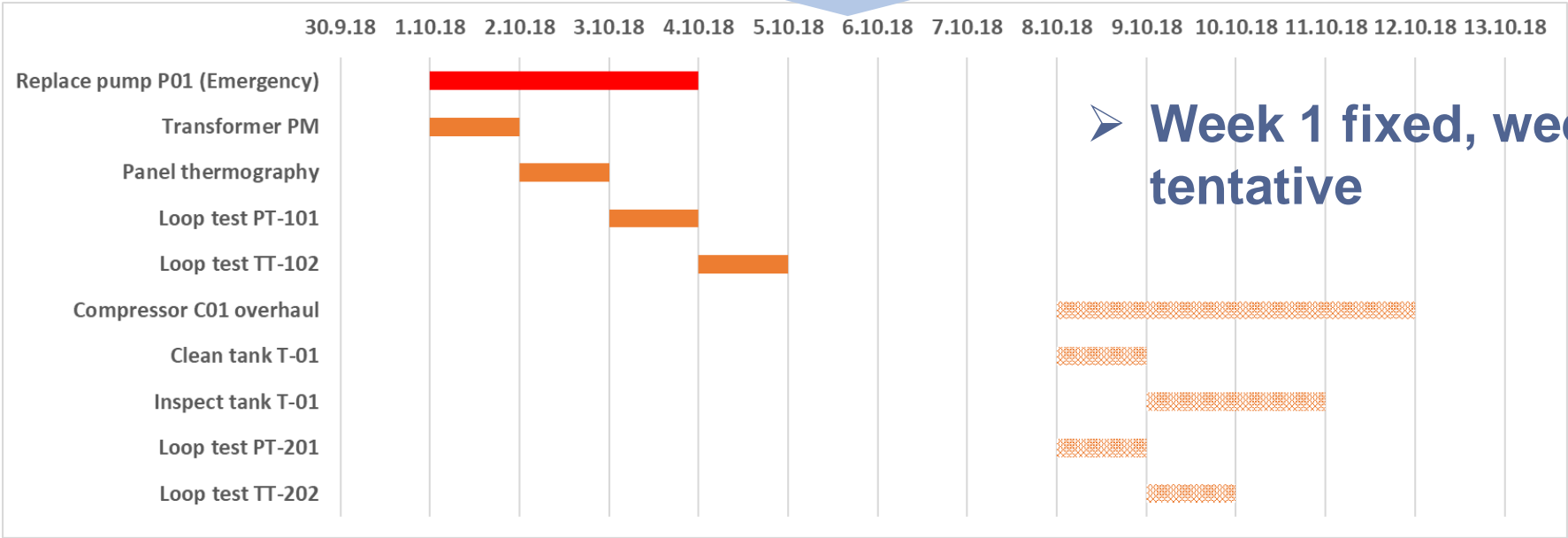
The best planners:

- Walk the job
- Seek input from others

THE BASIC WORKFLOW PROCESS

SCHEDULE

Priority
Labour
Tools & equipment
Materials
Procedures & permits



➤ **Week 1 fixed, week 2 tentative**

THE BASIC WORKFLOW PROCESS

EXECUTE

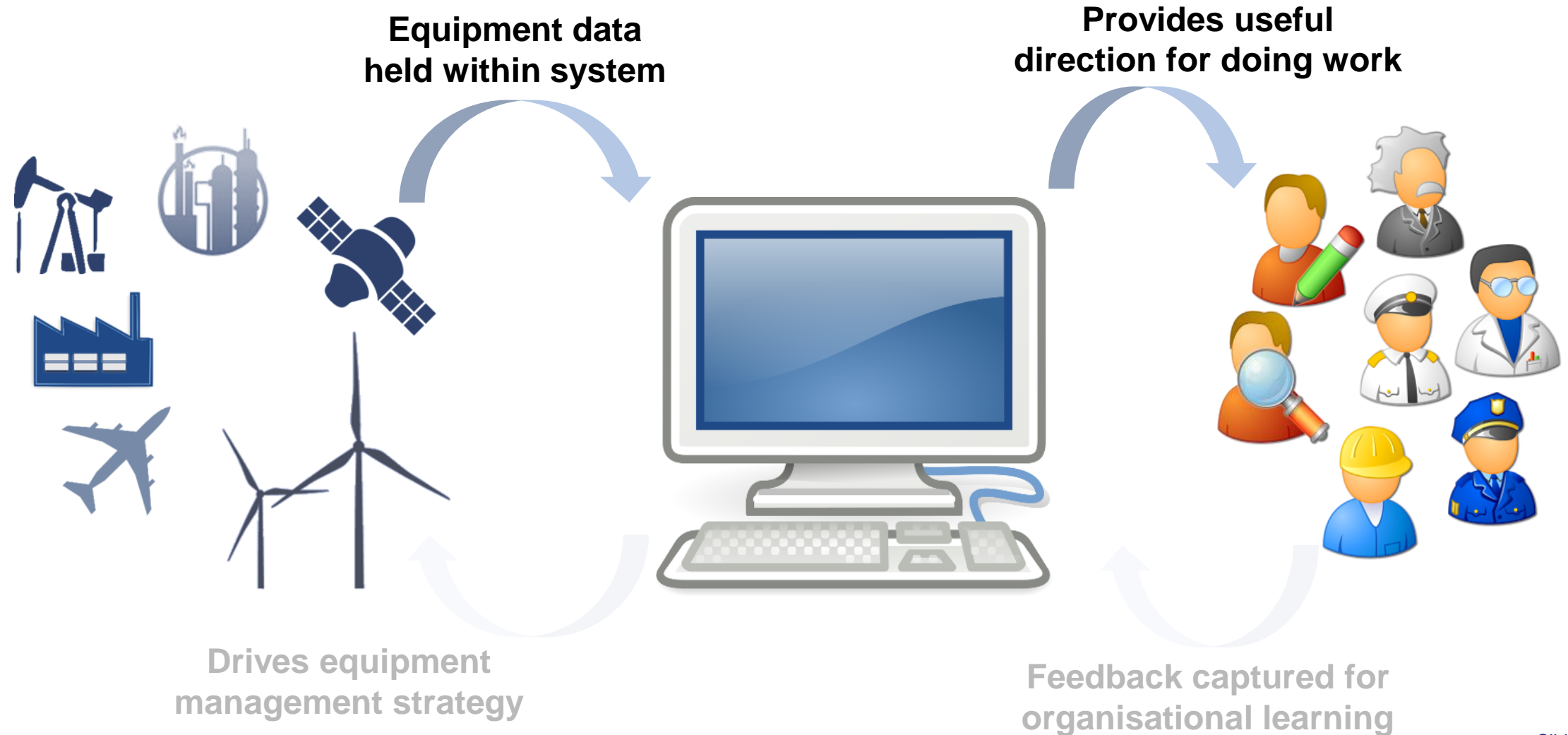
If everything is planned and prepped – the day of the job should go smoothly...

- All preparations made before the tradesmen arrive
- All materials in place and correct
- All tools and work equipment available and in good working order
- All risk assessments completed and actions closed out
- All performance standards agreed and communicated

➤ **Things can, and will, still go wrong. Good supervision are alert, astute trouble shooters and quick to raise the flag if needed**

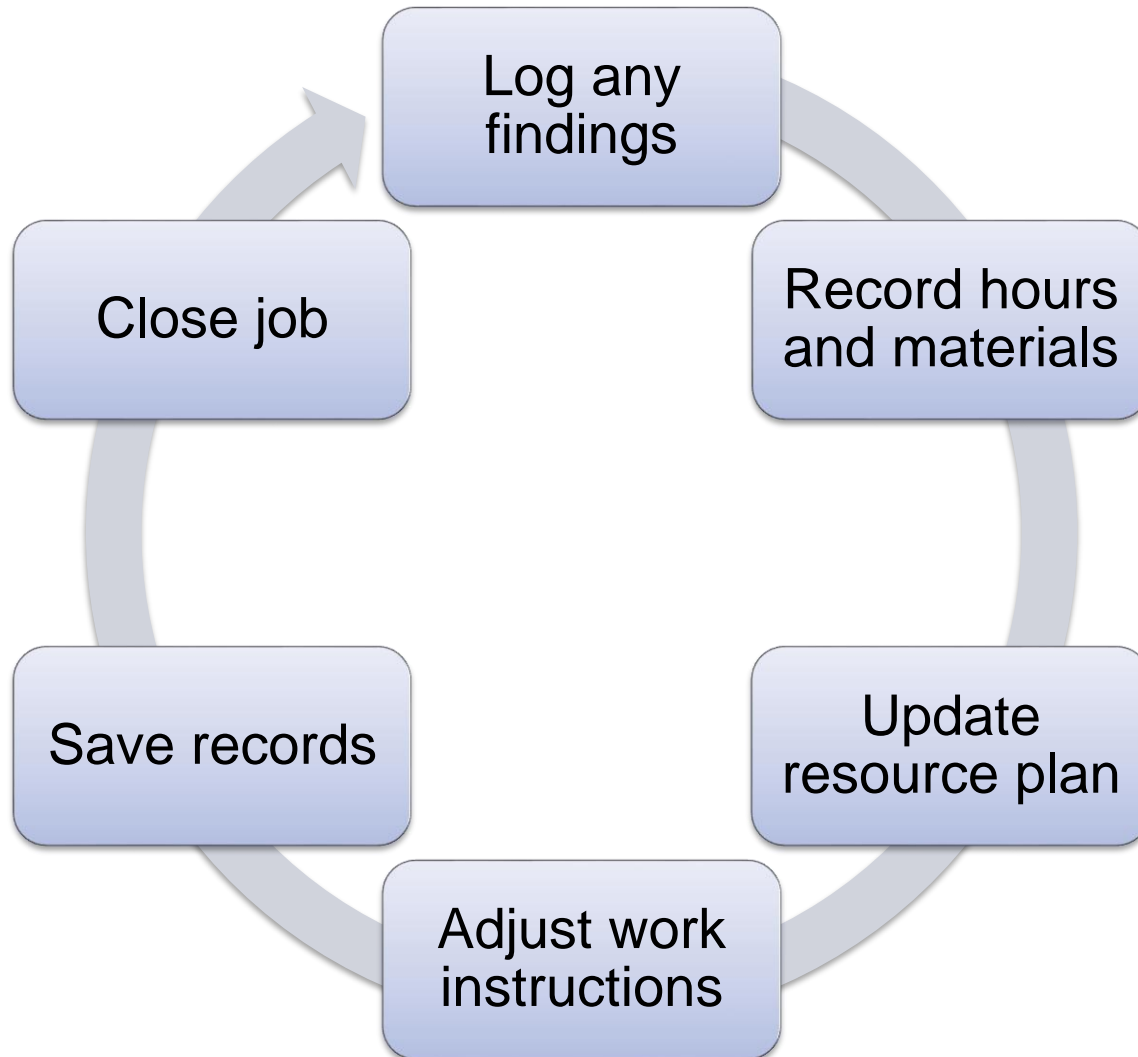


BUILDING OUR SYSTEM



THE BASIC WORKFLOW PROCESS

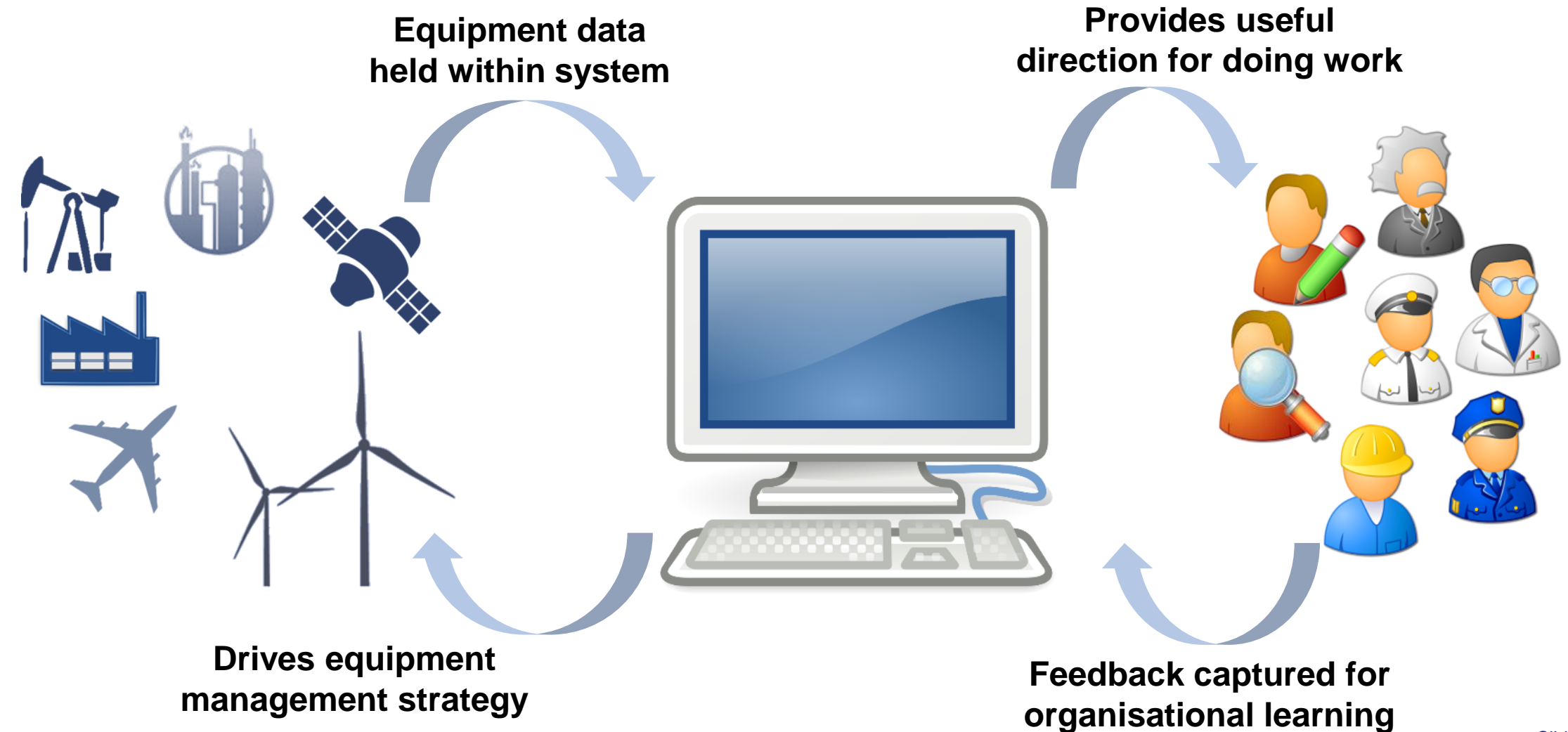
FEEDBACK



Every job is an opportunity to learn, encourage feedback from the team

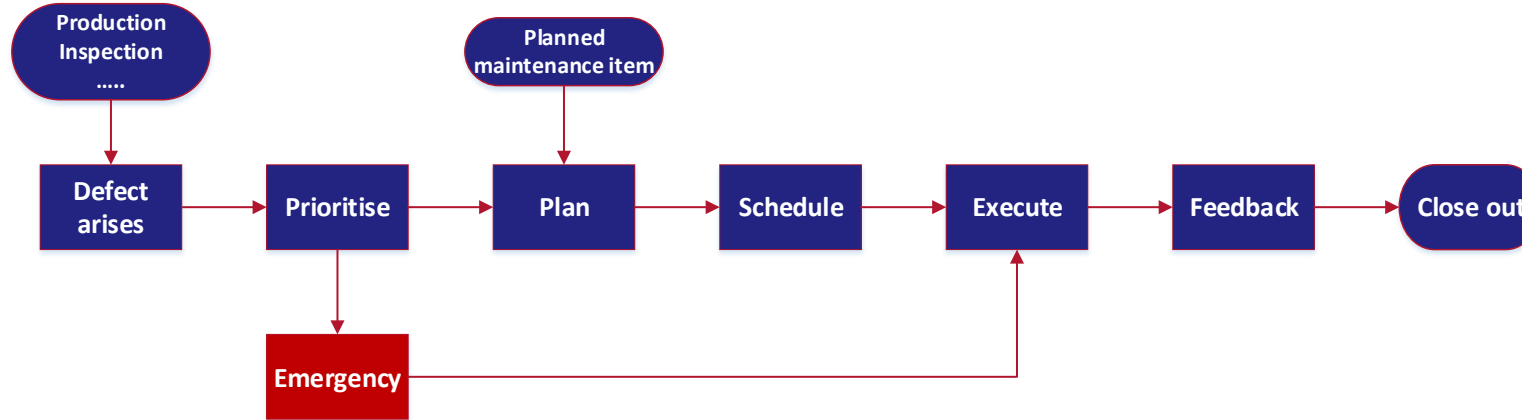
- **Formalising the feedback process helps ensure quality data capture**
- **Review oddball and complex tasks**
- **Feedback includes the full process starting from when the defect was identified**

COMPLETING OUR SYSTEM



THE BASIC WORKFLOW PROCESS

EMERGENCY WORK



URGENT ≠ “DO WHATEVER IT TAKES”

Emergency work should follow the same basic process....

....but skips scheduling, to do ASAP

- If you have a high proportion of reactive work – “plan” for it in the short term but work to eliminate it

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ROLES

WHO DOES WHAT?

We've already discussed organisational complexity, this will have a bearing on the roles required?

- Planner? Scheduler? Planner-scheduler?
- Tradesman-planner?
- Supervisor-planner?
- Maintenance manager-scheduler?

Any combination of the above?



➤ **What is the most important is that the responsibilities are covered**

ROLES

WHO DOES WHAT?

We've already discussed organisational complexity, this will have a bearing on the roles required?

- Planner? Scheduler? Planner-scheduler?
- Tradesman-planner?
- Supervisor-planner?
- Maintenance manager-scheduler?

Any combination of the above?



➤ **Beware of giving one person too many hats!**

ROLES

RACI MATRIX

Responsible – person who does the task

Accountable – person who bears ultimate accountability – ensures responsible person is:

- Assigned
- Has the skills & training
- Has the time
- Has the necessary tools

Consulted – person who either should or shall be consulted regarding doing the task

Informed – person who must be informed of the outcome

ROLES

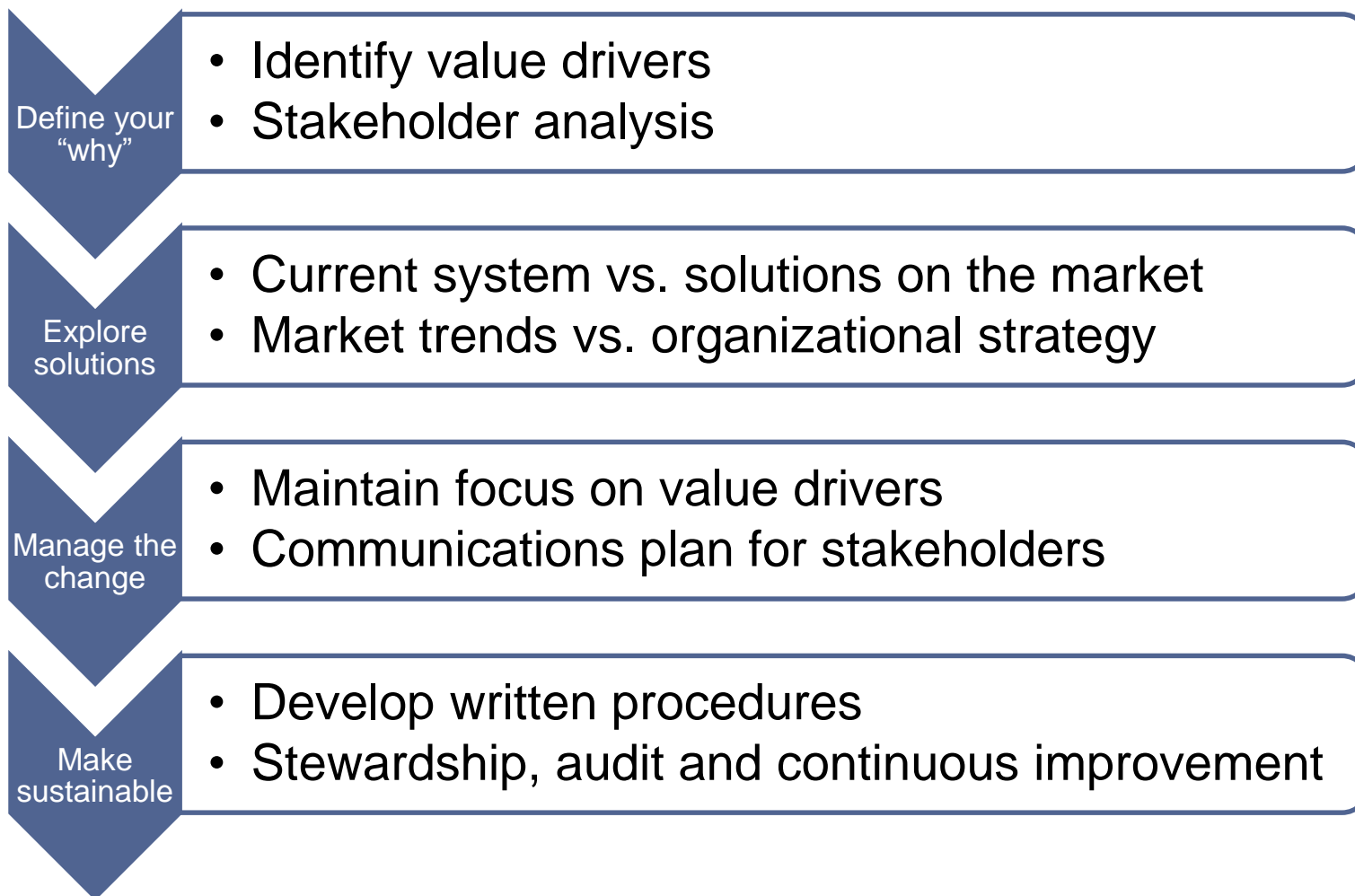
RACI MATRIX EXAMPLE

Task	Job title	Prioritisation								Planning										Scheduling								Execution								Feedback																						
		Create work notification	Assign priority according to available info	Decision - emergency?	Follow call out procedure	Create notifications - arising from maintenance	Prioritise notification - arisen from maintenance	Review priority in morning meeting	Decision in morning meeting - emergency/high priority?	Prepare list of PM orders & accepted notifications	Select priority jobs for planning	Decision - deliver in house?	Decision - work procedure exists?	Assign planning task to technician	Arrange contractors	Prepare isolation procedures / safe system of work	Job stepping	Identify materials required	Identify equipment required	Decision - materials & equipment available?	Assemble job kit	Inform maintenance co-ordinator task ready to schedule	Order materials and equipment	Decision - job ready for scheduling?	Expedite job requirements	Provide production schedule	Provide 2-week manpower plan	Prioritise available planned jobs	Confirm tasks ready to schedule for week 1	Book hire equipment for week 2	Confirm week 1 jobs	Preliminary confirmation week 2 jobs	Create week 1 permit requests	Prepare permits	Issue schedule	Prepare equipment as per isolation procedure	Confirm preparations and place isolations	Issue permit	Gather materials and equipment	Safety discussion / point of work risk assessment	Accept permit	Carry out maintenance task	Decision - able to meet quality requirements & timescale?	Inform maintenance co-ordinator of problem	Hand back to production - sign off permit	Assess impact on week 1 plan, decide way forward	Inform maintenance co-ordinator task complete	Set PMO to TECO and notification to NOCO in SAP	Decision - any opportunities for improvement?	Inform maintenance manager of improvement opportunity	Provide production report	Provide schedule compliance report	Review improvement opportunities	Select improvement opportunities for further work	Execute improvements			
Senior production technician		R	R	R	R	I	I	I		I				I	C	C	C	C											C	C	I	I		C	I	R	C	I				C							I	R								
Production technician		R	R	I		I	I	I		I				I	C	C	C	C											C	C	I	I		C	I	R	C	I			C							I	R									
Maintenance technician			C	I		R	R	I	I		I		C	I	I	C	R	R	R	R	R	R	I	I	I				C	C	I	I	C	C	I	R	C	C	R	R	R	R	R	R	R	I	R	C	R	R				I	R			
Production manager		A	A	A	A	I	I	R	R	I	R	I			I	A							I			R	I	R	C		R	R		A	I	A			A					I	I	I	I	I	I	I	I	I	I	R	R	R		
Maintenance manager		I	I	I		A	A	R	R	R	R	R	R	R	A	C	A	A	A	A	A	A	A	A	A	I	R	R	A	A	R	R	A	I	A				A	A	A	A	I	I	I	I	A	I	A	A	A	I	R	R	R			
Maintenance Co-ordinator		I	I	I		I	I	C	C	C	R	C	C	C	R	C	C	C	C	I	I	I	R	R	R	I	I	R	R	R	R	R	R	I	R	C	I	I				C	A	A	A	R	A	R	C		I	I	R	R	R			
Permit to work issuer		I	I	I		I	I	C	C	I	R	I			I	R	C	C	C				I			I	I	R	C	C	R	R	C	R	I	R	R	R				C	I	I	I	I	I			C		I	I	R	R	R		
Site leader		I	I	I		I	I	A	A	A	A	A	A												A	A	A			A	A			I																	I			A	A	A	A	A

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IMPLEMENTATION MODEL



IMPLEMENTATION CASE STUDY



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The challenge

- Small chemical manufacturer – part of a global group
- CMMS installed, however
 - Only one trained user
 - Reactive work not logged
 - No planned maintenance (regulatory compliance only)

The solution

- Developed maintenance workflow process in line with organisation and requirements
- Assigned roles and responsibilities
- Delivered training program for targeted roles

The benefit

- “No job without a notification”
- “Two week” planning cycle
- Developing maintenance program

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SUMMARY

We have:

- Explored our challenges
- Discussed computerised systems
- Looked at the people and the equipment
- Proposed a basic workflow for maintenance execution
- Defined the roles involved
- Acknowledged that a model for implementation is required

➤ **Any questions?**



**THANK YOU FOR JOINING
THIS PRESENTATION.**

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