

Emerging Practices and Complementary Technologies

Presenter: Rich Adams

IAM Conference 2019





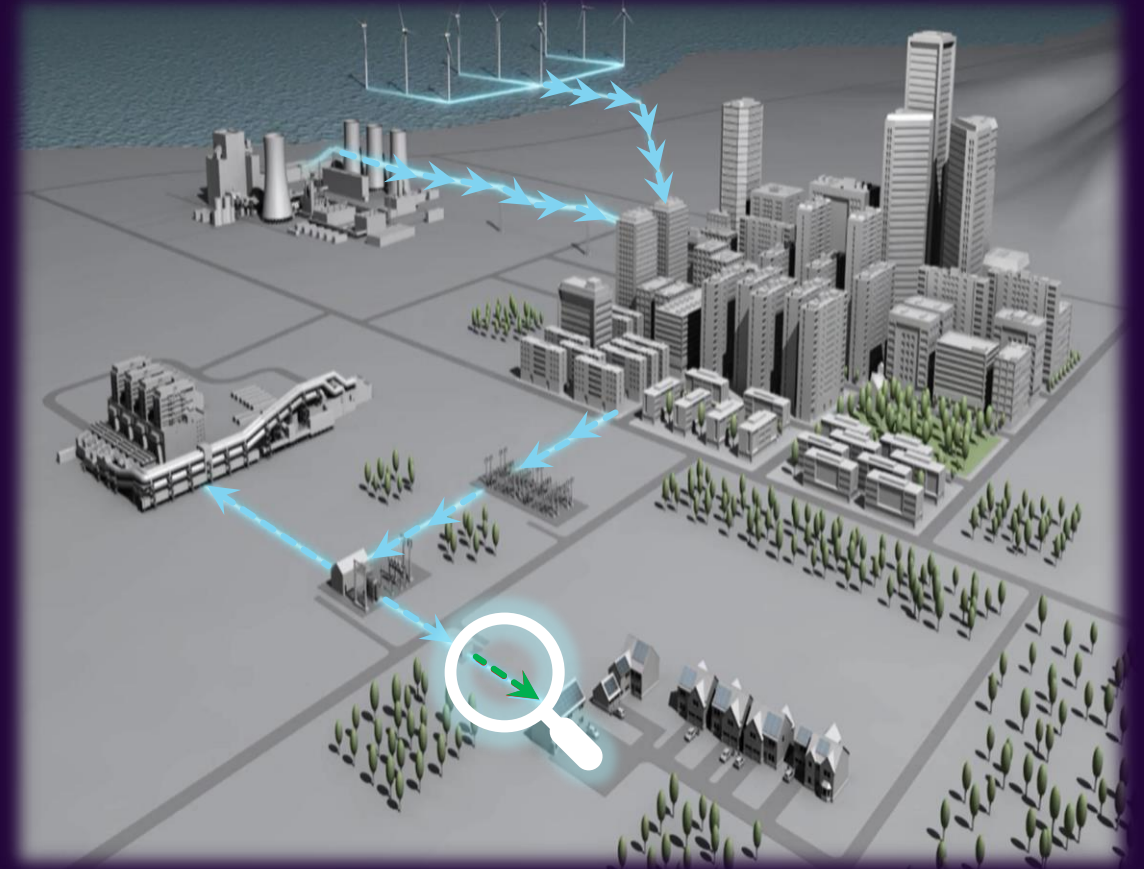
Emerging Practices

- Active Monitoring
- Data BUS storage and retrieval
- IoT, Machine Learning and AI



How are they being used?

- Combined views and analysis of Faults, Capacity and Risk on the networks.
- Seamless data sharing between systems using data bus technologies and big data stores
- Tracking the whole business/network plan and impact of planned and unplanned change



Digital Line of Sight

Digital Line of Sight

What is it?

- Executives,
- Shareholders,
- Regulators
- Public

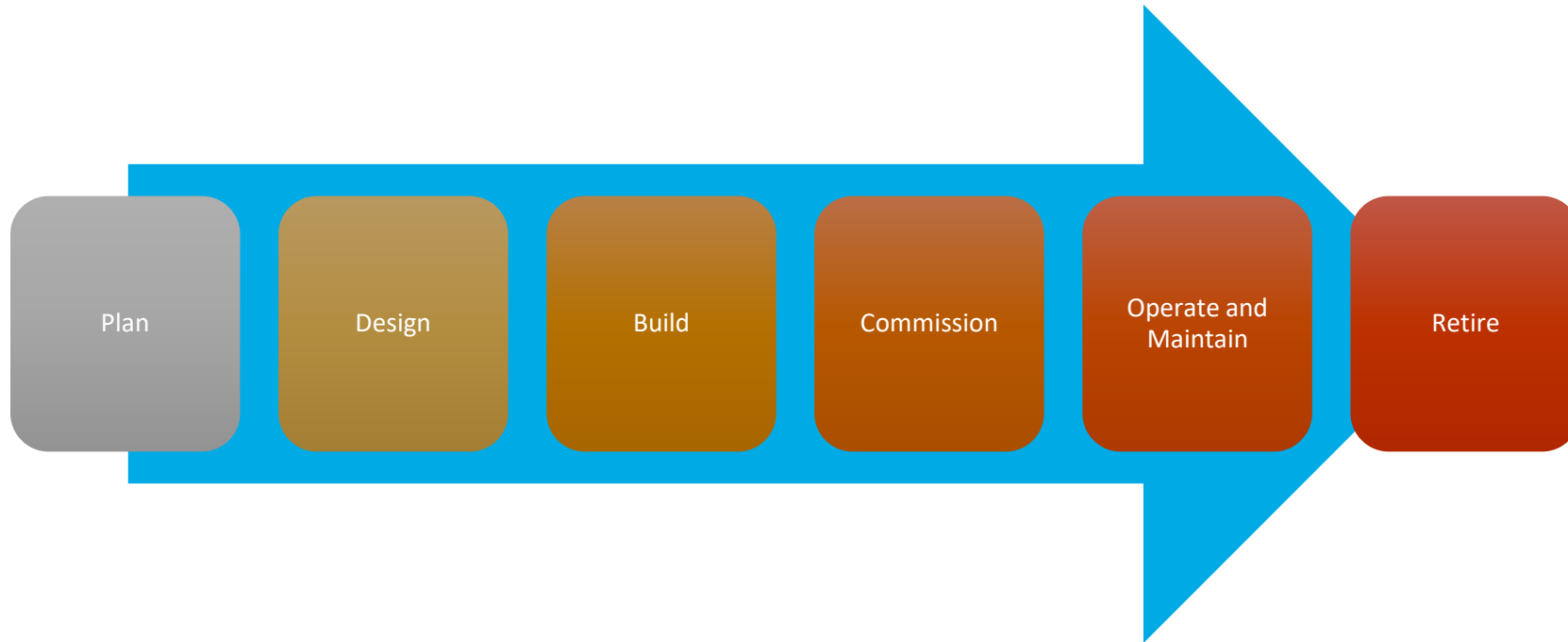


- Workforce



Digital Line of Sight

What is it?



Digital Line of Sight

Connections

The asset is of key importance

Digital line of sight can help with:

- Safe work execution
- Efficient work practices
- Reduction in field operational time
- Fewer operational delays and less downtime
- Full awareness and reaction to issues
- Higher levels of operational performance due to improved consistency
- Higher workforce productivity
- Workforce know the reason they are doing the activities they do on a day-to-day basis (improves moral and quality of performance)
- Shortening of decision-making time and increase in effective decision-making
- Enhanced outage planning and implementation
- Performance aligned to corporate strategy and organisational goals
- Optimal TOTEX spend to meet organisational goals
- Reduction in risk associated with the assets

Digital Twins

Digital Twins

What are they?



Data Model



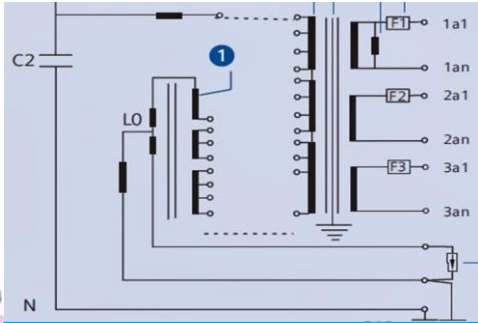
Set of Analytics or Algorithms



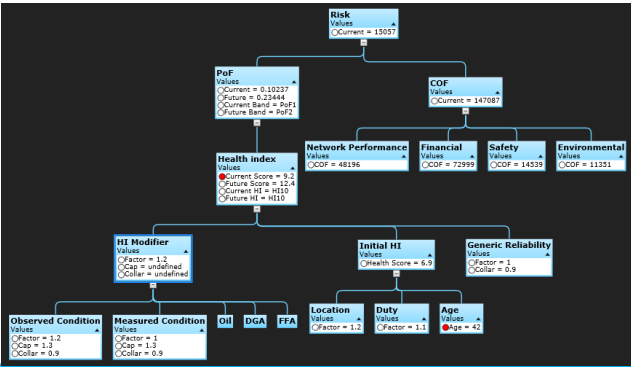
Knowledge



Training Video



Schematic



Analytical Model



Photos

Severity	Classification	Consequences	PROBABILITY				
			1	2	3	4	5
			< 1% Remote	1% - 5% Extremely Unlikely	5% - 20% Very Unlikely	20% - 50% Unlikely	> 50% Likely
5	Catastrophic	Multiple fatalities, > 5. Large effects on large external inhabited zones, sewerage fatalities	5	10	15	20	25
4	Catastrophic	Lethal effect on several persons (several fatalities). Lethal external effect - one fatality, several physical injuries	4	8	12	16	20
3	Major	Lethal effect on one person and/or several permanent invalidities. Permanent external effects	3	6	9	12	15
2	Serious	Permanent injury, lost time accident. Non-permanent external effects	2	4	6	8	10
1	Moderate	No permanent injury, recoverable with no loss, time/medical treatment. No external effect	1	2	3	4	5

Failure Modes and Consequences



Power Transformer



KPIs and Current Status

Electrical Apparatus	Preventive Maintenance	PM Frequency				
		Weekly	Monthly	Annually	Every 2 Years	Every 3 Years Change Oils if required
Battery Systems	Check Voltage Check Voltage Alarm Specific Gravity and Plates	•	•			
Emergency Transfer Schemes	Standby Generators—run up Complete Transfer	•	•			
Main Circuit Breakers	Operational Check Oil Inspection			•	•	
Main Substation Transformers	Temperature & Load Check Oil Inspection		•		•	
Motors	Bearings Grease Ventilation					•••
Protection	Cleaned and Checked for Calibration Kilowatt-hour Meters				••	
Substation High Voltage	Incoming Lines—Dirty Atmos Incoming Lines—Clean Areas			•	•	
Unit Substations	Ground Indicators Sump Pump Housekeeping Temperature & Load Check		•••			

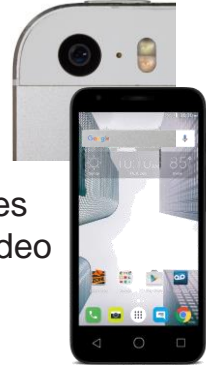
Inspection Report

History in Time

Changing Landscape



- Mobile phones with photo/video and built in comms



- Drone inspections



- 3d holographic network models?
- Augmented reality

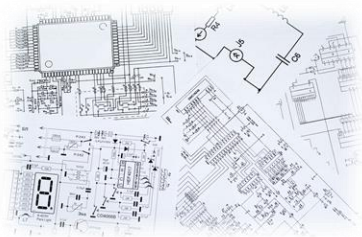
- PDA field devices and external modems for comms

2000

Today

The Future

- Paper maintenance records and designs



- Large scale server-based storage, Web based design tools.



- Autonomous network management

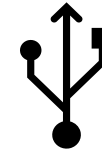


What companies have now

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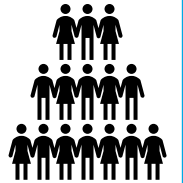
Systems

- Enterprise asset management system
- SCADA – real-time data feeds and control
- Field based mobile inspection
- Mass data storage



Teams

- Inspection teams
- Maintenance teams
- Restoration crews
- Asset management teams
- Regulatory reporting teams
- Social media teams



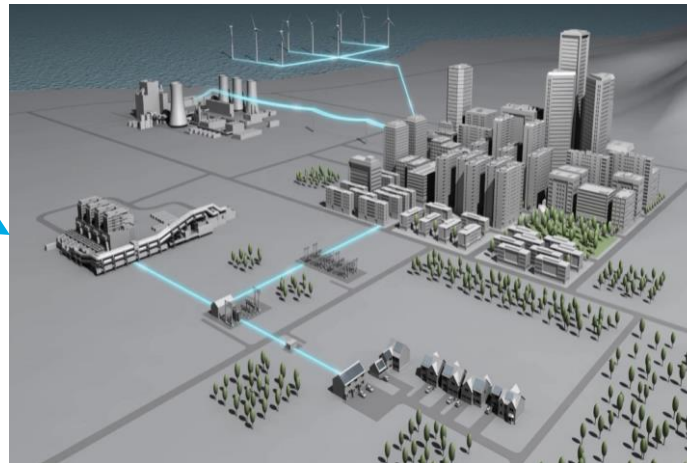
Applications

- Demand modelling/forecasting
- Network design tools across voltage levels
- On-line policy, safety and training media
- Fault report capture
- Asset health and risk models
- Oil testing and analysis
- Tree growth forecasts
- Flood risk models
- Weather forecasts



Information

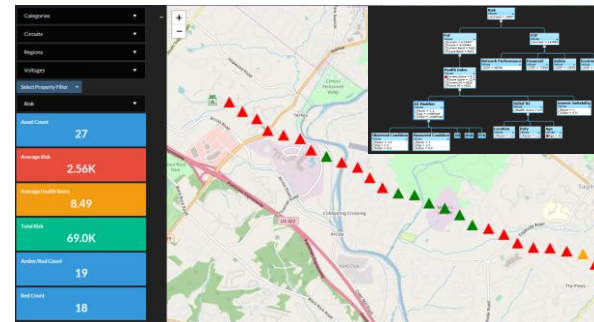
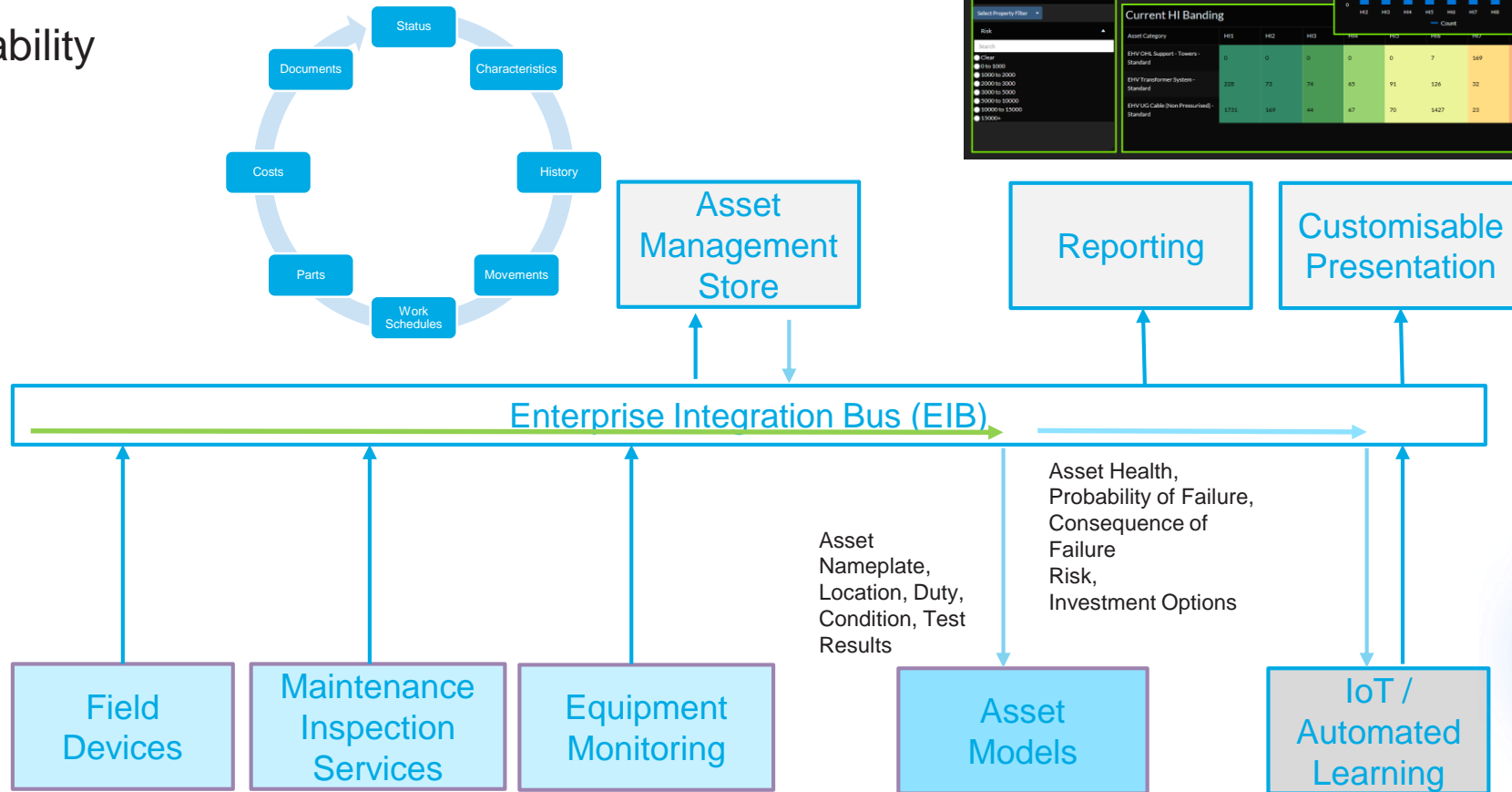
- Asset definition
- Staff availability
- Equipment levels
- Job costs
- Purchase costs
- Training



Where companies are heading

Enterprise Data Bus

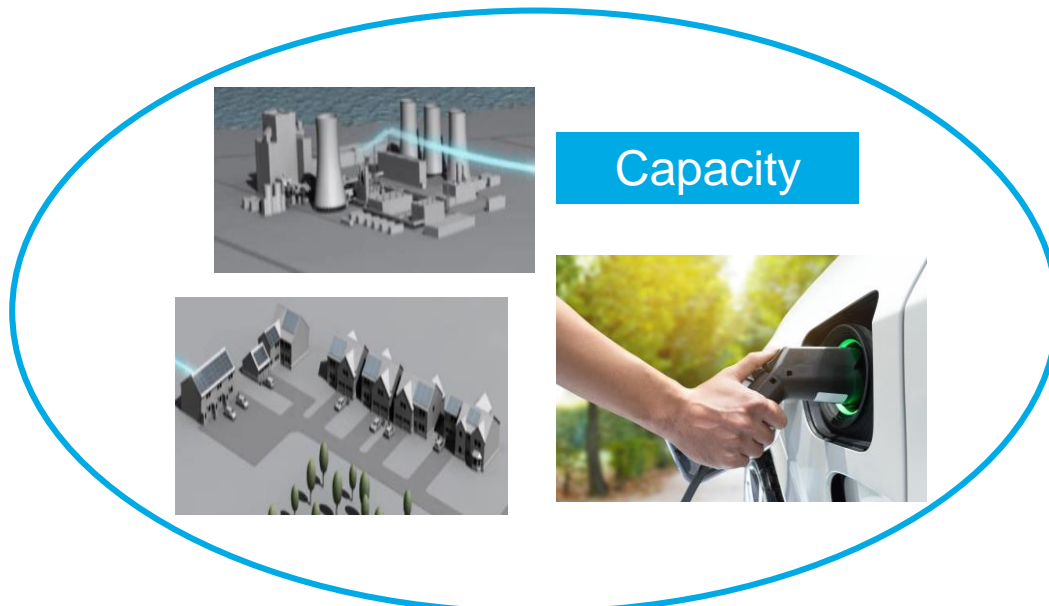
Data Availability



Line of Sight

Faults, Capacity and Risk

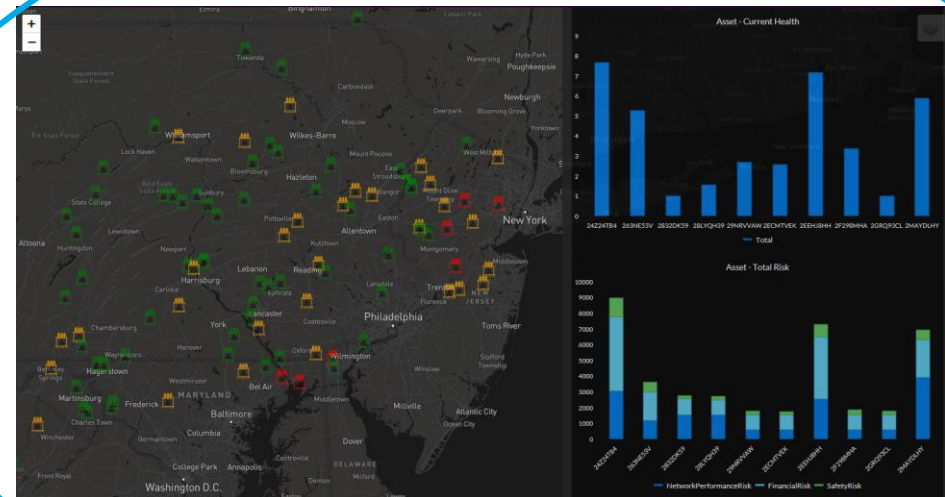
Combined views and analysis of Faults, Capacity and Risk on the networks.



Capacity



Faults



Risk

Line of Sight

Consumer Behaviour

Technologies being deployed to allow consumer access to impact of power usage

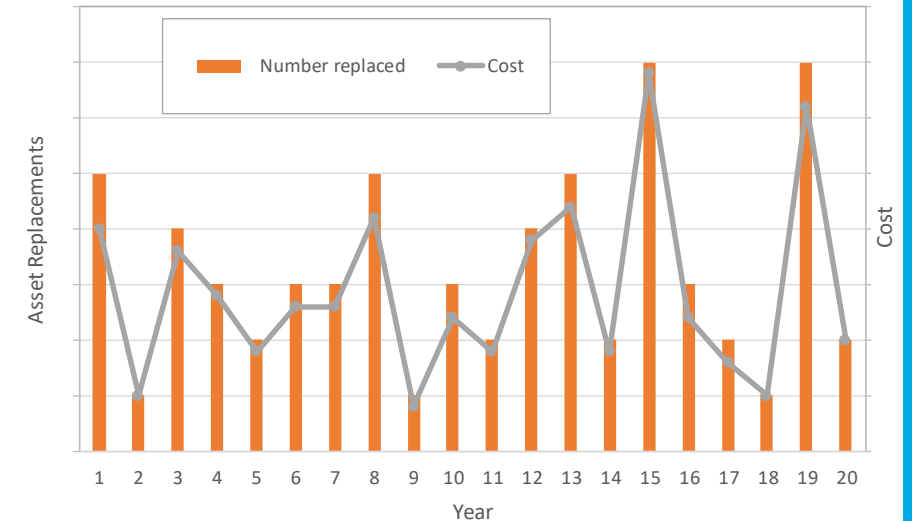
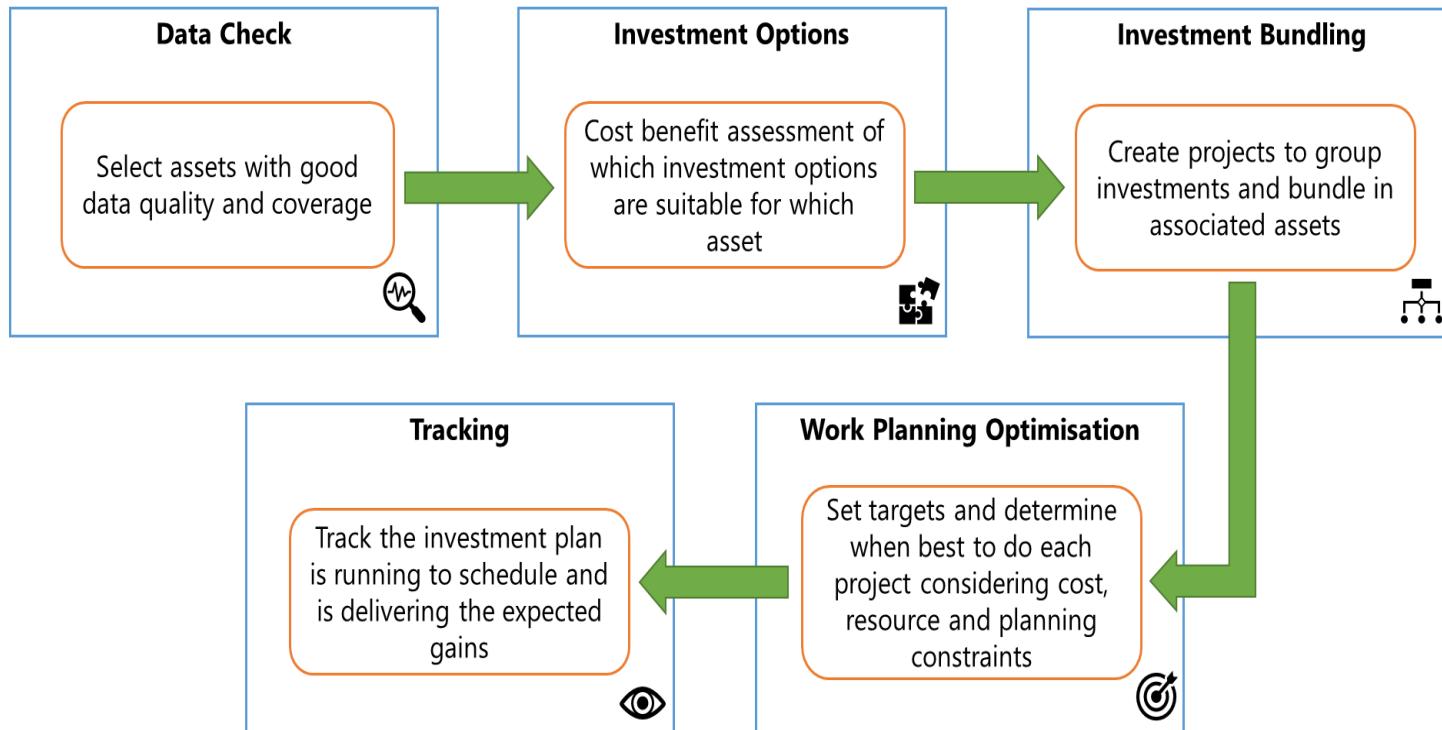


Can this be used to influence how and when power is used?

Line of Sight

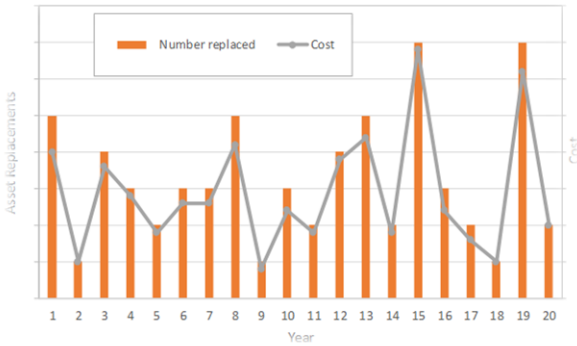
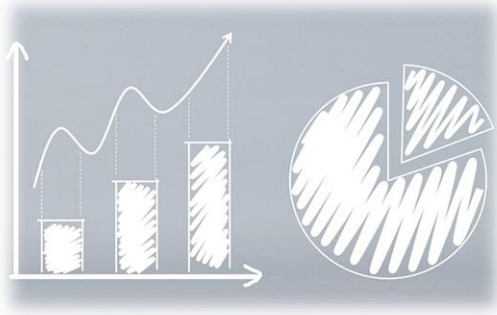
Tracking the business

Tracking the whole business/network plan and impact of planned and unplanned change



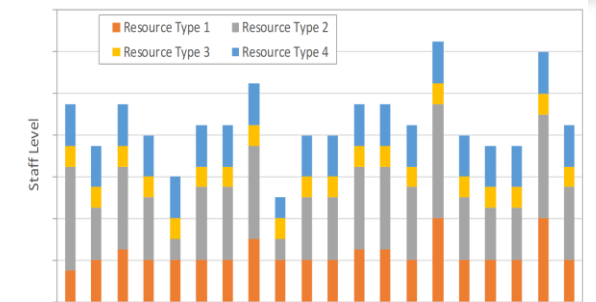
Financially Optimised Replacement Program

Mapping Skills Availability to Investment Plans



Equipment Availability

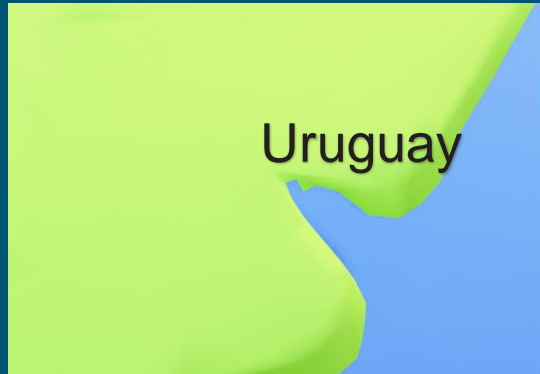
Financially Optimised Replacement Program



Required Staffing & Skills to Deliver Program

Final Thoughts

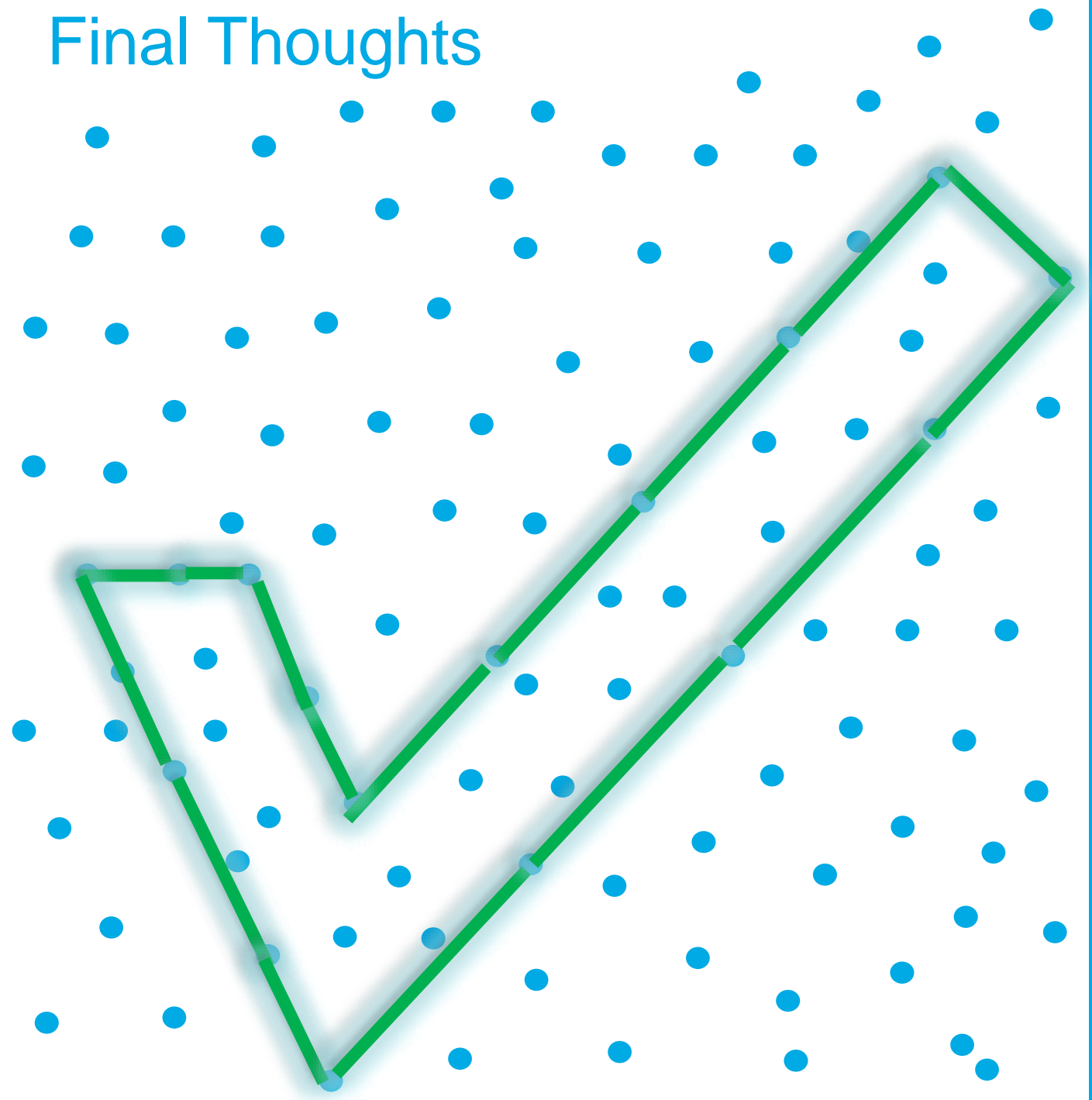
The risks of not having the information



The benefits of having the information



Final Thoughts



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Thank you!



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ANY
QUESTIONS?

