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The Australian Power Institute

# Syndicate Group 9

# Executive Challenge Board Paper

# Executive Challenge

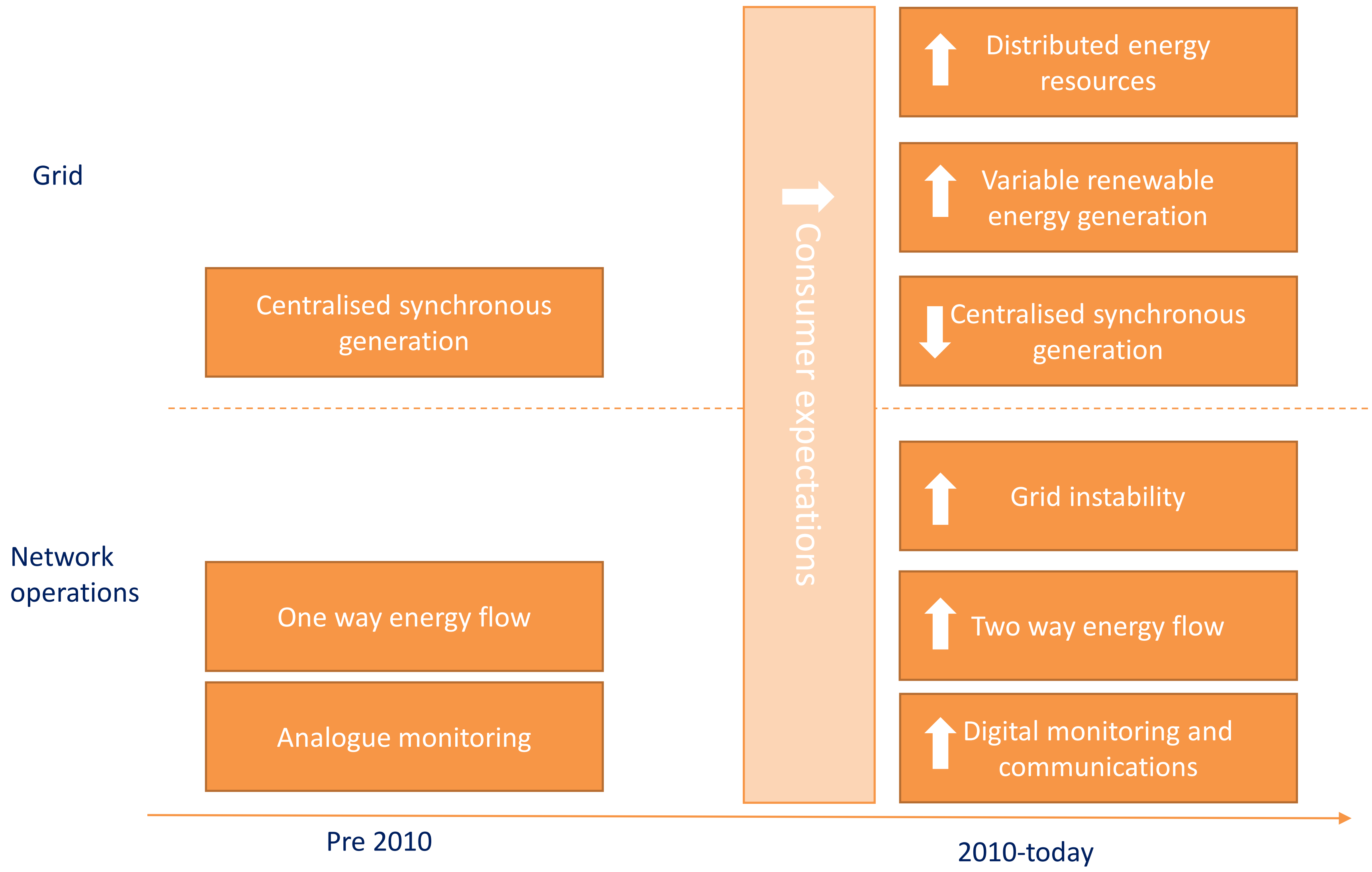


With the power system becoming increasingly complex and dynamic:

- How can **innovations and technologies be deployed** to support power system operations in **processing lots of information** and **making real-time decisions and actions** to maintain a safe, reliable and secure network at all times?

- What can we learn from **other industries** that **use big data and automation** heavily in their operations?

# Current State

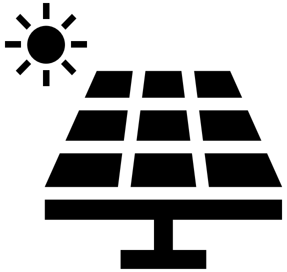



The energy sector is undergoing rapid change.

The growth of variable renewable energy (VRE) generation and distributed energy resources (DER) has changed the paradigm of how the power system was originally designed and operated.

Consumer preferences and expectations are becoming increasingly complex due to greater consumer awareness and control of self-consumption and generation, and concerns regarding climate change.

# Key Challenges

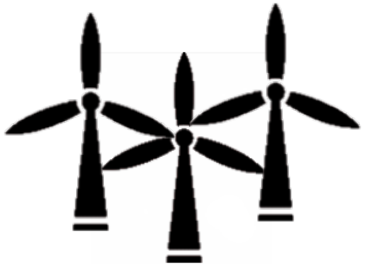


## DER

Limited low voltage network visibility and control over DER to ensure ongoing network security

Two way energy system poses a safety and operational risk for the distribution network

Markets and frameworks not established to support two way energy system at the distribution level



## VRE

The increase in VRE generation and decrease in synchronous generation is causing grid stability issues (system security, inertia, etc.)

VRE is a less predictable generation source when balancing the supply and demand of the grid and needs to be paired with alternative technologies to maximise value

# Key Challenges

## Network operations

Current assets were designed for one way power flow and thus two-way power flow will cause asset aging acceleration e.g. circulating current due to unmatched transformer impedance

Two way power flows introduce safety challenges to personnel and the public

Networks need to squeeze out all value from the existing asset base without impact safety, security and reliability

## Customer expectations

Customers want cheaper, greener, two-way power without sacrificing reliability, safety and affordability

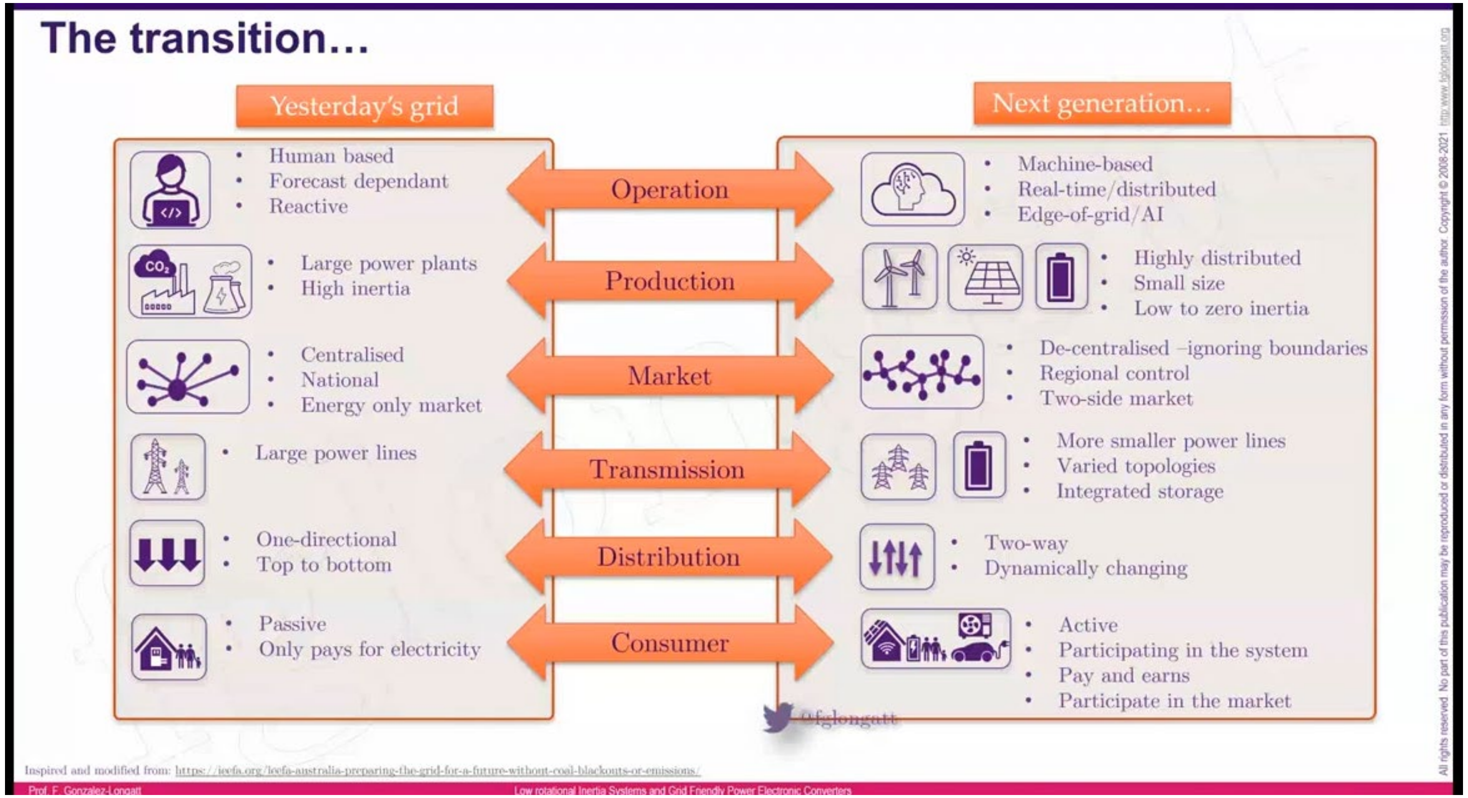
## Organisational structures

Siloed operations in businesses and across industry due to lack of transparency in data and information

Lack of asset management maturity for Information Communication Technology (ICT) assets and lack of business investment in design, development, procurement, maintenance and operations of ICT assets, including data

# Need for Innovation






## Benefits

- Improving safety outcomes for personnel and public
- More efficient operations due to improved decision making
- Improving consumer satisfaction/outcomes through greater flexibility
- Taking advantage of advances in technology
- Succeeding within a changing regulatory environment
- Optimising timing and costs to build and maintain assets and manage risk
- Improving asset productivity and service management
- Creating new revenue streams
- Improving pricing and returns on capital
- Improving environmental sustainability
- Protecting asset valuation
- Competing with new market entrants
- Improving employee capability

# Innovations and Technologies



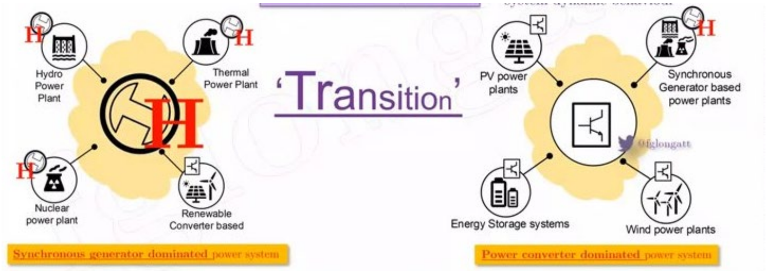
## Community and neighbourhood batteries

- Install to reduce energy prices and support system security, improve reliability in outage-prone areas, defer/avoid network upgrades, enhance local hosting capacity and expand access to storage

Image: United Energy.

## Grid forming inverter trials

- Install appropriately sized grid-forming inverters at strategic sites (weak grid areas) in the national electricity market (NEM) to reduce the system's reliance on synchronous generation
- Battery Energy Storage Systems (BESS) can provide adjustable synthetic inertia to support system stability and security





## Demand response

- Allow distribution network service providers (DNSPs) to balance supply and demand of electricity by reducing demand for electricity during peak periods

## Real time monitoring devices

- Enables greater flexibility with network operators due to more data points to inform decisions

# Technology Strategies

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## "Agile" network trials and implementation

- Customer centric focus
- Flexible delivery process for technical development activities and stakeholder engagement
- Gather learnings for complex projects and develop skills with cross functional project teams
- Improved outcomes from iterative and short cycle processes
- Efficient use of skilled resources and better risk management

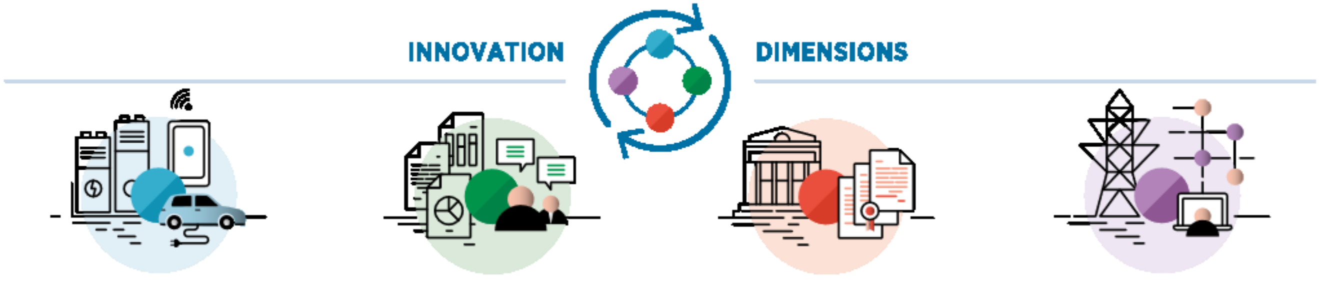

Source: nvisia

## Gathering insights

- Active collaboration with electricity network corporations from around the world
- International member-based organisations, working groups, conferences and solutions modelling to solve the challenges faced by countries with high VRE and DER penetration

# No silver bullet!

The future grid will require diverse combinations and interactions between enabling technologies, business models, market design and system operation to deliver a safe, secure and reliable power system.




**ENABLING TECHNOLOGIES**

1 Utility scale batteries
2 Behind-the-meter batteries

3 Electric-vehicle smart charging
4 Renewable power-to-heat
5 Renewable power-to-hydrogen

6 Internet of Things
7 Artificial intelligence and big data
8 Blockchain

9 Renewable mini-grids
10 Supergrids

11 Flexibility in conventional power plants

**BUSINESS MODELS**

12 Aggregators
13 Peer-to-peer electricity trading
14 Energy-as-a-service

15 Community-ownership models
16 Pay-as-you-go models

**MARKET DESIGN**

17 Increasing time granularity in electricity markets
18 Increasing space granularity in electricity markets
19 Innovative ancillary services
20 Re-designing capacity markets
21 Regional markets

22 Time-of-use tariffs
23 Market integration of distributed energy resources
24 Net billing schemes

**SYSTEM OPERATION**

25 Future role of distribution system operators
26 Co-operation between transmission and distribution system operators

27 Advanced forecasting of variable renewable power generation
28 Innovative operation of pumped hydropower storage

29 Virtual power lines
30 Dynamic line rating

# External Industry Insights

## Finance

Inform and automate risk analysis and decision making

Gain customer insights and delivery of enhanced services

## Transport

Real time analytics to process adaptive cruise control, emergency braking, object detection etc.

Fleet learning and deep neural networks to train auto-pilot systems

Hazard detection – anticipate emerging local and system security risks

## Manufacturing

Workflow and process automation and optimisation

Enhance quality of products

Reduce equipment downtime

Optimise costs

Risk reduction

Schneider Electric

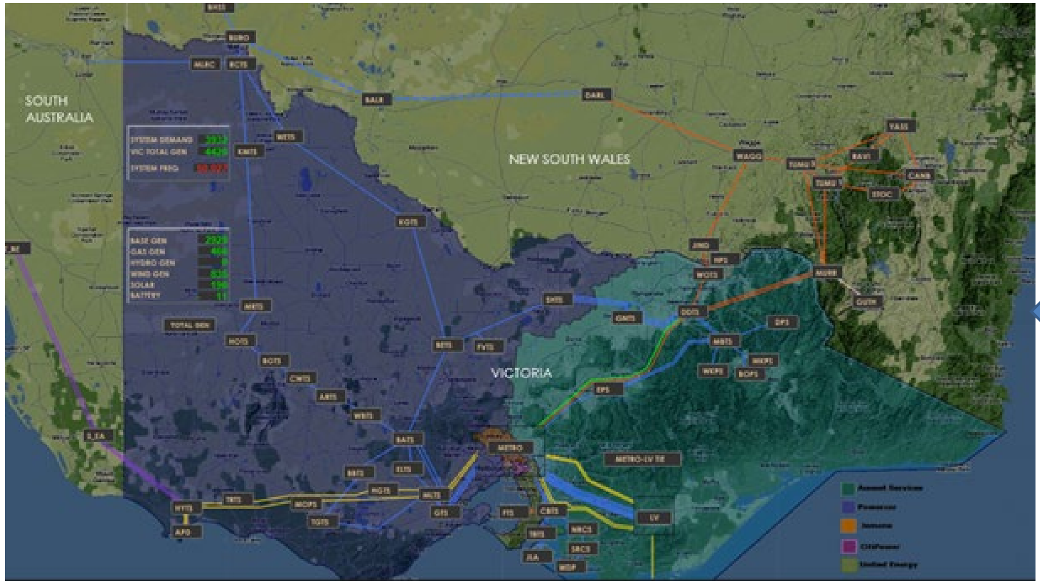
VOLVO

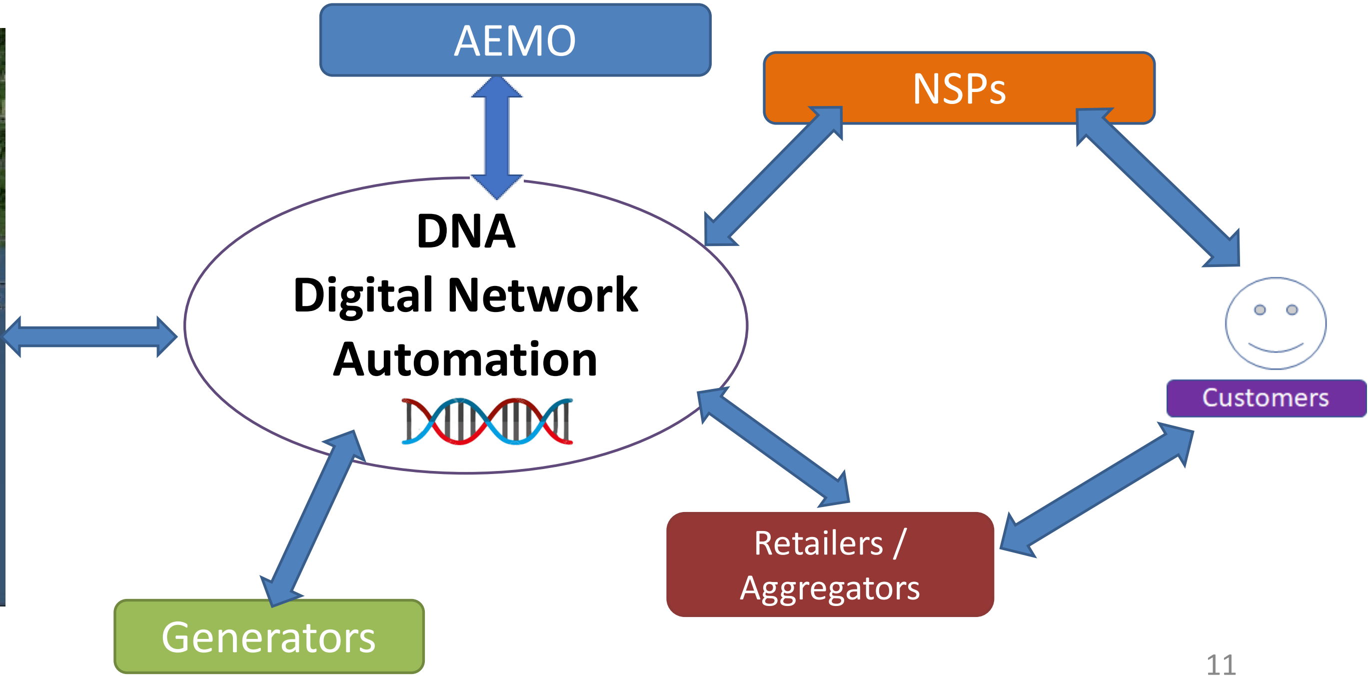
# Key Recommendations



Propose a shared digital network automation (DNA) system between the Australian Energy Market Operator (AEMO), generators, network service providers (NSPs), retailers, aggregators and customers

- **Technology:** using "Big Data" & AI technology (machine learning)
- **Accessibility:** defined accessibility levels for all parties
- **Functionality:** dynamic (real-time) network information sharing & automatic control capability
- **Purposes:** remove silos and promote transparency to enable effective network operation & management



# Key Recommendations

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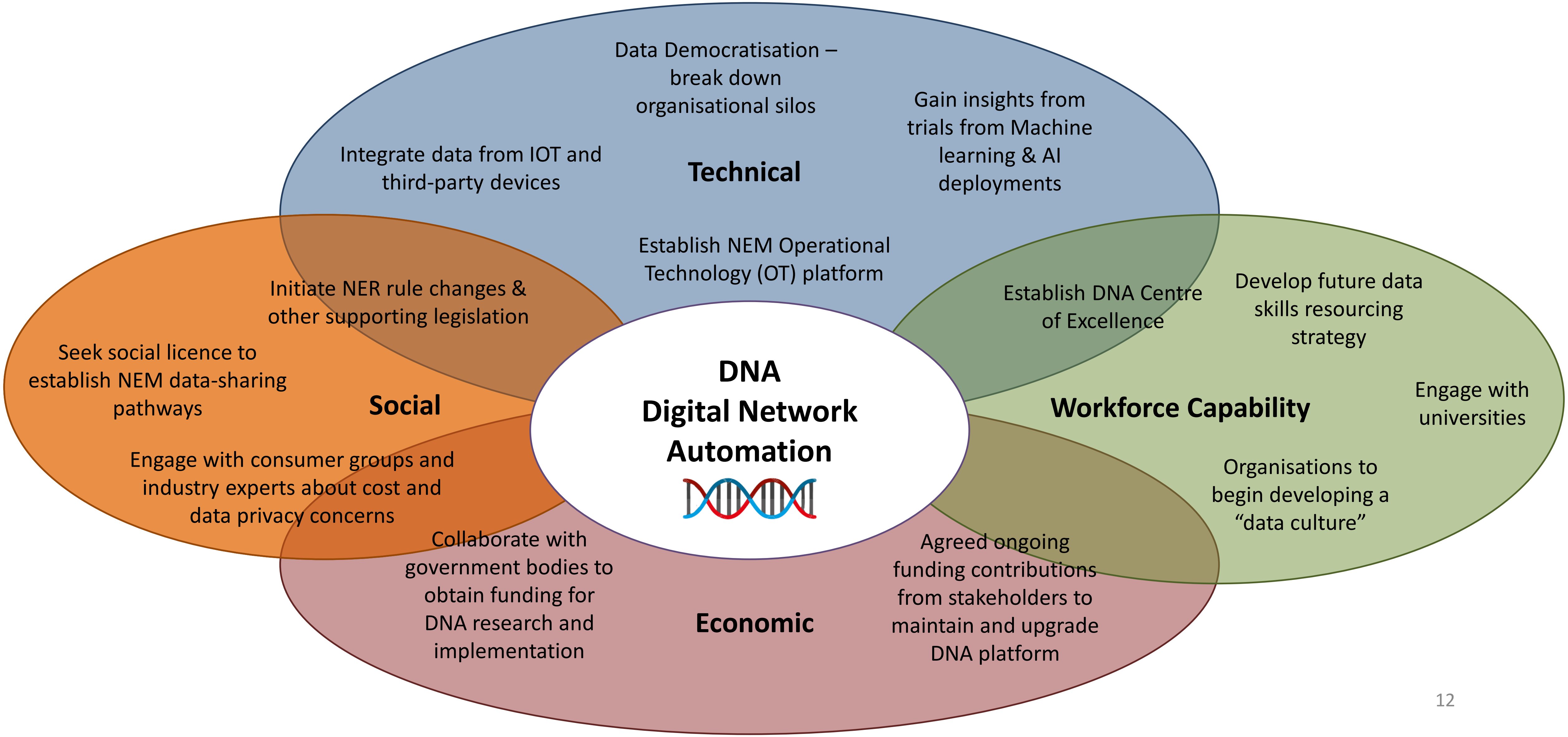


# Risk Assessment

| Cyber security | Energy policy and regulation | Financial | Stakeholder | Capability |
|---|---|---|---|---|
| Cyber attack leading to loss of control of the network and/or loss of critical business system and data. | Energy policy and regulation does not enable energy transition. | Insufficient funding to implement and maintain DNA. Excessive implementation costs. | Rejection by stakeholders of DNA | Insufficient skill sets to deliver DNA strategy and platform |
| Identify key cyber risks, implement and uplift cyber protection mechanisms, automate and streamline cyber security operations, stress testing of systems. | Involve energy policy makers and regulators in the development of the DNA strategy and implementation plan so that rule changes and regulations can be implemented in a timely and appropriate manner. | Obtain funding from research bodies to trial and pilot proof of concept cross-organisational data platforms.<br><br>Industry to collaborate with Governments and regulators around funding, operations and maintenance of DNA and agree ongoing funding arrangements<br><br>Competitive tender for final DNA solution. | Develop stakeholder engagement plan and start public consultation to seek social licence for NEM data-sharing pathways.<br><br>Engage with consumer groups and industry experts about cost and data privacy concerns. | Work with education departments and universities to develop pipeline of students with data and analytical skills.<br><br>Increase in workplace flexibility to attract and retain broader talent pools.<br><br>Plan investment and exposure to new technologies thereby increasing capability of current workforce. |

# Future Workforce Requirements



## Future skills

Big data and analytical skills

Artificial intelligence and machine learning

Online collaboration

## Retention

Increase in workplace flexibility to attract and retain broader talent pools
e.g. flexible work location and hours etc.

## Capability

Plan investment in, and exposure to, new technologies to increase capability of current workforce

Re-structure graduate recruitment programs to develop data and analytical skills and familiarity with tools

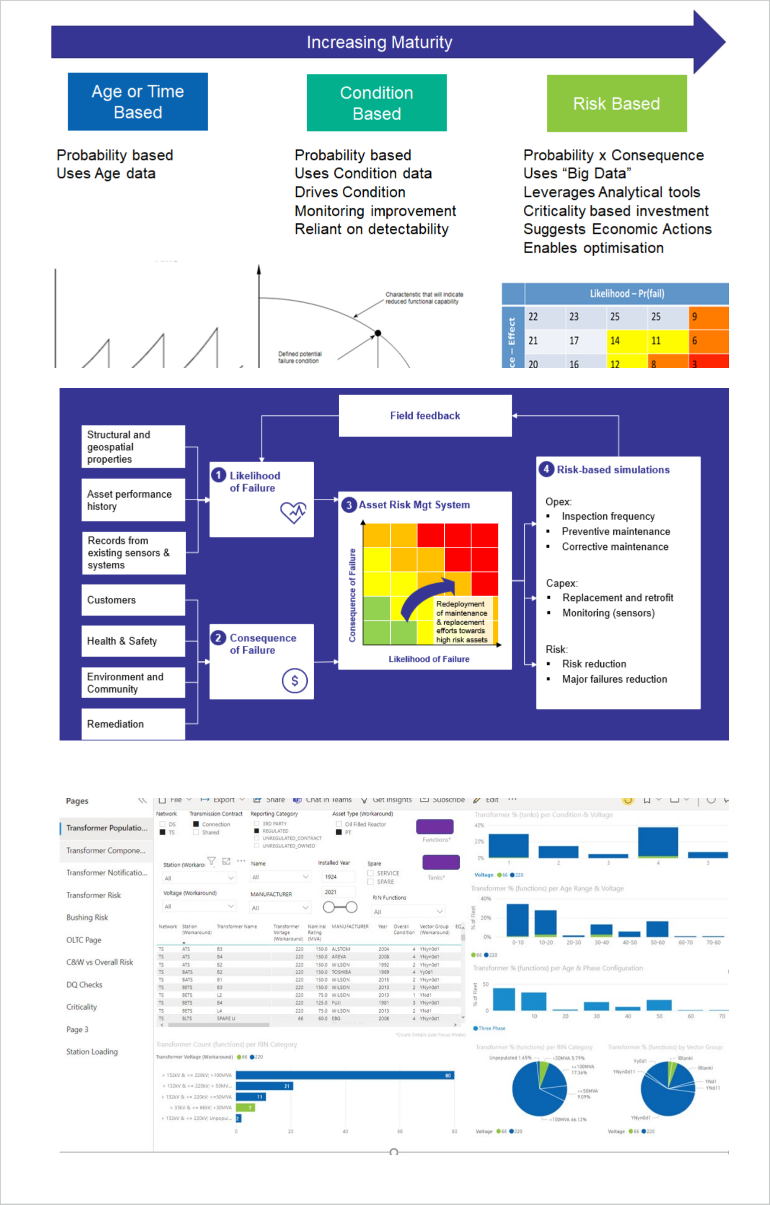
## Capacity

Workforce planning within organisations to address succession planning risks and future growth

Work with education departments and universities to develop pipeline of students with data and analytical skills in engineering and non-engineering streams

## Organisational design

Simplify operating models to drive performance, accountability and commerciality




# Future/Additional Benefits

Asset management evolution from time and condition-based to risk-based, leading to more efficient capital and operating expenditure

Use machine learning models to predict the likelihood of failure for a given asset within the next 12 months

Promote corporate transparency to avoid silos and achieve maintenance & outage optimisation by connecting localised information to public dashboard

Reduce effort and have greater timelines of performance reporting, leading to improved decision making

# Biographies

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**Jimmy Kuang, AusNet Services**
*Lead Engineer – Asset Management (Transformer & Reactive Plant SME)*

Jimmy has over 13 years of experience with more than 10 year in HV testing and 3 year in asset management. He is passionate about transformer life-cycle management and ensuring no bathtub failure and fit-for-purpose for future energy grids.

**Brendan Spiniello, SA Power Networks**
*Senior Secondary Systems Planning Engineer – Network Planning*

Brendan has 12 years of experience in the power industry, with a focus on protection and control systems. He is looking forward working though the challenges facing the industry while maintaining a safe and reliable network.

**Rebecca Harvey, Energy Queensland**
*Network Operations Lead Engineer – Regulatory and Emerging Technology*

Rebecca has over seven years of experience as a Network Operations Engineer within Queensland distribution networks. She is passionate about ensuring the ongoing operability, safety and security of future energy grids.

**Lincy William, AGL Energy**
*Project Engineer- C&I Energy Solutions*

Lincy is an Electrical engineer with 5 years of experience in Renewable energy integration and background in LV system design for Nuclear Power Plant(BoP). She is looking forward to contribute to delivery of innovative technologies and solutions for future energy security.

**Sandra Thaow, TasNetworks**
*Revenue Reset Program Manager*

Sandra has over 16 years of experience in the energy industry ranging from regulation through to asset management, works delivery and network operations. She is passionate about developing the workforce of the future and solving complex challenges with diverse teams.

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# Executive Challenge Board Paper: Supplemtary Information

# External industry insights

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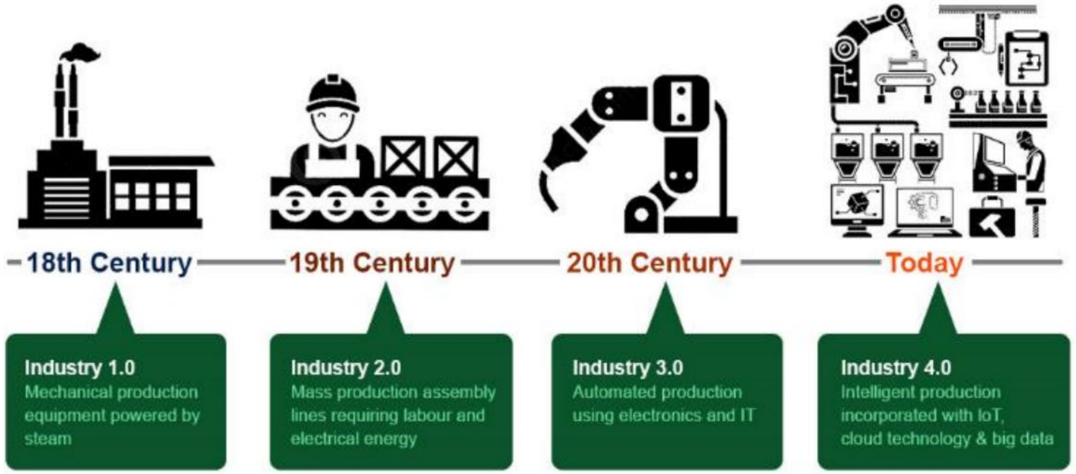


- The 2021 KPMG Fourth Industrial Revolution Benchmark
  - **Customer Experience (CX)** is a primary driver for adoption by Financial Services, Health, Community Services and IT industries
  - **Product & Service Innovation, Increasing Productivity, and Generating new Insights** are primary drivers for adoption for Manufacturing industries

# External industry insights


**LACK OF SKILLS IN THE WORKFORCE**

**LEGACY TECHNOLOGY**

**RELUCTANCY TO EMBRACE CHANGE**

**ABSENCE OF STRATEGY**

are some of the most common themes as to why business leaders are not feeling confident to deal with the 4IR.

**"The organisation (leadership) is very focused and ready to move forward with technological change however both the willingness and skill-set of the current staff does not match the rate at which the organisation wishes to progress."**

**"Little to no investment in 4IR with most expenditure and effort stuck in existing (legacy) products."**

"Lack of understanding of the potential of these technologies and how they can be leveraged, resulting in no coherent vision of how these technologies will impact the future of work in, and service delivery by, our organisation."

**"Many of these technologies and their impacts have the potential to be transformational, which in turn requires a transformational change response. Most organisations – be they public or private sector – struggle with transformational change."**

"Preparedness has focused on risk or crisis scenarios, rather than opportunity."

**"We have begun to explore some technologies and are committed to develop a long-term strategy but do not currently have a vision or understanding of how they will impact our business."**

"Still happening in a siloed way by products or divisions, vs across business end to end hampers readiness."

"We are a small business and with things evolving so rapidly it is difficult to know how much to invest and when without technology becoming redundant."

# External industry insights

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FIGURE 19 Technologies likely to be adopted by 2025, by share of companies surveyed, selected sectors

| Technology/Sector | AGRI (%) | AUTO (%) | CON (%) | DIGICIT (%) | EDU (%) | ENG (%) | FS (%) | GOV (%) | HE (%) | MANF (%) | MIM (%) | OILG (%) | PS (%) | TRANS (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3D and 4D printing and modelling | 54 | 67 | 39 | 39 | 69 | 69 | 27 | 45 | 65 | 69 | 48 | 79 | 40 | 60 |
| Artificial intelligence (e.g. machine learning, neural networks, NLP) | 62 | 76 | 73 | 95 | 76 | 81 | 90 | 65 | 89 | 71 | 76 | 71 | 76 | 88 |
| Augmented and virtual reality | 17 | 53 | 58 | 73 | 70 | 75 | 62 | 56 | 67 | 54 | 57 | 71 | 57 | 62 |
| Big data analytics | 86 | 88 | 91 | 95 | 95 | 76 | 91 | 85 | 89 | 81 | 90 | 86 | 86 | 94 |
| Biotechnology | 50 | 18 | 48 | 40 | 46 | 47 | 46 | 38 | 65 | 31 | 16 | 36 | 28 | 23 |
| Cloud computing | 75 | 80 | 82 | 95 | 95 | 88 | 98 | 95 | 84 | 92 | 87 | 86 | 88 | 94 |
| Distributed ledger technology (e.g. blockchain) | 31 | 40 | 41 | 72 | 61 | 50 | 73 | 40 | 72 | 41 | 50 | 46 | 53 | 38 |
| E-commerce and digital trade | 80 | 75 | 85 | 82 | 72 | 71 | 90 | 67 | 78 | 82 | 62 | 62 | 70 | 87 |
| Encryption and cyber security | 47 | 88 | 85 | 95 | 86 | 88 | 95 | 95 | 84 | 72 | 83 | 71 | 78 | 75 |
| Internet of things and connected devices | 88 | 82 | 94 | 92 | 62 | 94 | 88 | 79 | 95 | 84 | 90 | 93 | 74 | 76 |
| New materials (e.g. nanotubes, graphene) | 15 | 46 | 22 | 36 | 67 | 65 | 36 | 33 | 47 | 51 | 37 | 36 | 27 | 27 |
| Power storage and generation | 75 | 64 | 59 | 38 | 27 | 88 | 55 | 33 | 31 | 62 | 57 | 69 | 45 | 46 |
| Quantum computing | 18 | 21 | 17 | 51 | 25 | 41 | 44 | 36 | 38 | 21 | 29 | 25 | 19 | 38 |
| Robots, humanoid | 42 | 50 | 38 | 44 | 47 | 24 | 47 | 31 | 47 | 41 | 15 | 17 | 25 | 21 |
| Robots, non-humanoid (industrial automation, drones, etc.) | 54 | 60 | 52 | 61 | 59 | 65 | 53 | 50 | 56 | 79 | 90 | 79 | 35 | 69 |
| Text, image and voice processing | 50 | 59 | 82 | 90 | 89 | 88 | 88 | 89 | 88 | 64 | 76 | 87 | 79 | 65 |

Source

Future of Jobs Survey 2020, World Economic Forum.

Note

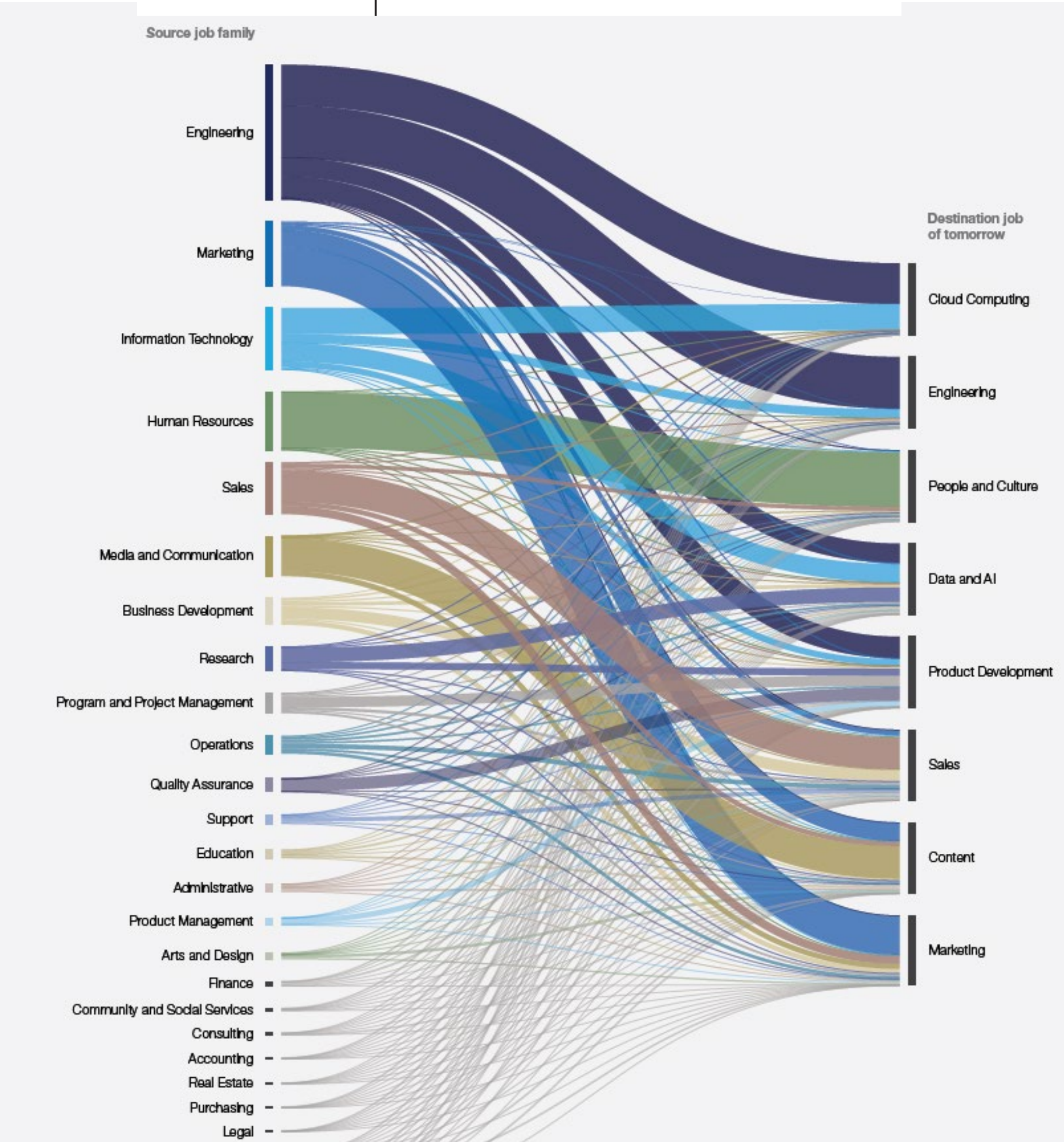
AGRI = Agriculture, Food and Beverage; AUTO = Automotive; CON = Consumer; DIGICIT = Digital Communications and Information Technology; EDU = Education; ENG = Energy Utilities & Technologies; FS = Financial Services; GOV = Government and Public Sector; HE = Health and Healthcare; MANF = Manufacturing; MIM = Mining and Metals; OILG = Oil and Gas; PS = Professional Services; TRANS = Transportation and Storage.

- World Economic Forum, The Future of Jobs Report 2020
- Over 80% of surveyed companies in the ENG (Energy Utilities & Technologies) Sector reported they would likely implement the following technologies by 2025:
  - Artificial Intelligence (e.g. machine learning, neural networks)
  - Cloud Computing
  - Encryption and Cyber Security
  - Internet of Things and Connected devices
  - Power storage and generation
  - Text, image and voice processing
- Sectors expected to follow a similar technology deployment path to ENG:
  - DIGICT (Digital Communications and Information Technology
  - EDU (Education)
  - FS (Financial Services)
  - GOV (Government and Public Sector)
  - HE (Health and Healthcare)
  - MANF (Manufacturing)
  - MIM (Mining and Metals)
  - TRANS (Transport)

# External industry insights




FIGURE 25 | Transitions into the jobs of the future




- World Economic Forum, The Future of Jobs Report 2020
- Engineers of today will transition to future jobs of:
  - Cloud Computing
  - Engineering
  - Data and AI
  - Product Development
- The Energy sector needs to invest in upskilling or re-training some engineers to meet the requirements of future jobs
- Conversely, to further build future job capability in cloud computing and Data and AI, we need to also be targeting and re-training resources from existing Information Technology jobs

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# External industry insights


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## Emerging and redundant job roles

Role identified as being in high demand or increasingly redundant within their organization, ordered by frequency

EMERGING

| | |
|---|---|
| 1. | Data Analysts and Scientists |
| 2. | Renewable Energy Engineers |
| 3. | Big Data Specialists |
| 4. | AI and Machine Learning Specialists |
| 5. | Software and Applications Developers |
| 6. | Mechanics and Machinery Repairers |
| 7. | Internet of Things Specialists |
| 8. | Construction Laborers |
| 9. | Digital Transformation Specialists |
| 10. | Robotics Engineers |

REDUNDANT

| | |
|---|---|
| 1. | Administrative and Executive Secretaries |
| 2. | Mining and Petroleum Extraction Workers |
| 3. | Accounting, Bookkeeping and Payroll Clerks |
| 4. | Accountants and Auditors |
| 5. | Power Production Plant Operators |
| 6. | Mining and Petroleum Plant Operators |
| 7. | Mechanics and Machinery Repairers |
| 8. | Legal Secretaries |
| 9. | Data Entry Clerks |
| 10. | Data Analysts and Scientists |

- **Focus on the Energy Sector**
- Organisations expect power production plant operators to become increasingly redundant
- May present opportunity to re-skill these workers to perform emerging roles such as:
  - Data Analysts and Scientists
  - Renewable Energy Engineers
  - Big Data Specialists
  - AI and Machine Learning Specialists
  - Software and Applications Developers

# External industry insights

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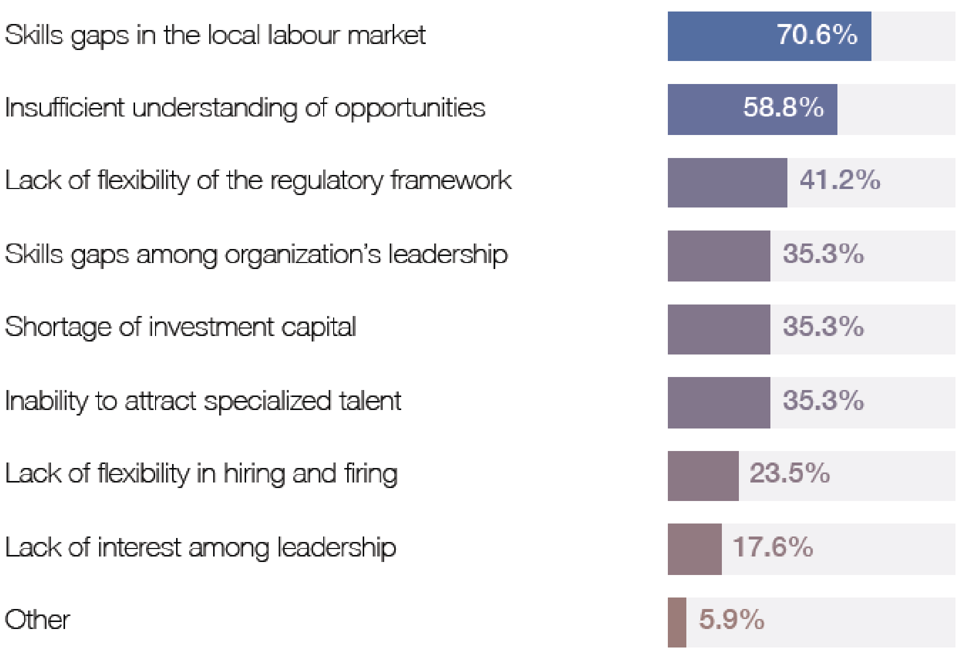
**Barriers to adoption of new technologies**

Share of companies surveyed




- **Focus on the Energy Sector**
- Organisations expect skill gaps in the local labour market to be the largest barrier to adoption of new technology
- The Australian Energy Sector needs a strategy to address skill gaps in our local market.
- Leaders also need more education about future technologies to help them understand and leverage opportunities
- Work should continue by the ESB and AEMC to ensure Australia's regulatory frameworks are flexible to realise the full benefits of big data technologies

# External industry insights

## Deloitte Preparing tomorrow's workforce for the Fourth Industrial Revolution


Business leaders and other stakeholders should address **four primary challenges** within the larger context of youth workforce development:

1. **Reimagine** 4IR as **a *unique opportunity* to be welcomed,** not a *problem* to be confronted
2. **Reposition** discrete and disconnected programs as a **systemwide, unified set of approaches**
3. **Realign** toward achieving **both scale *and* impact**, rather than framing solutions as scale *versus* impact
4. **Reframe the possibilities for marginalized youth,** including those who historically have been difficult to reach, with particular attention to women and girls

Complementary to these challenges, the report provides **four recommendations** for the business community to commit to:

1. **Align stakeholders' objectives and approaches:** Work with the broader ecosystem to align goals and outcomes for impact.
2. **Engage in public policy:** Strategically engage in public policy through dialogue, advocacy, collaboration, and influence.
3. **Develop promising talent strategies:** Analyze current talent strategies—particularly those focused on youth or under-represented populations—and implement best practices to promote inclusivity and innovation, and drive economic return through differentiation.
4. **Invest strategically in workforce training approaches:** Evaluate, invest, and promoteworkforce training programs that align with your corporate social responsibility goals, talent practices, skill needs, and corporate culture.

# External industry insights

10 May 2021

**Commonwealth Bank and data science leader Quantium launch CommBank iQ to help customers build Australia's future economy**

Commonwealth Bank announces a new joint venture with Quantium to deliver insights to Australian businesses, governments and investors.

**Westpac and Microsoft launch Data Driven Experience Platform**

19 November 2019

Westpac today announced its Data Driven Experience Platform (DDEP), a Microsoft Azure based data hub which draws on data sources from across Westpac Group to provide real-time, personalised insight to its customers.

## Focus on the Financial Services Sector

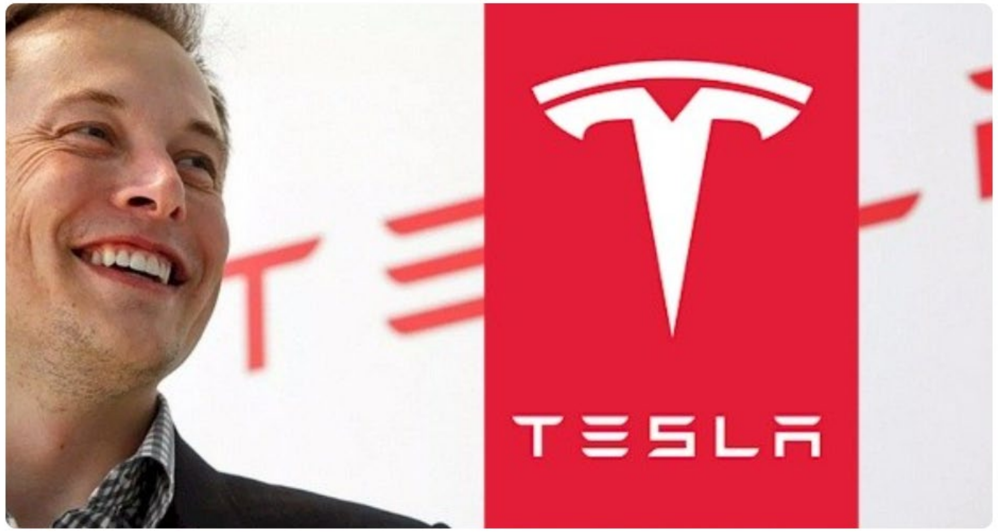
- Banks are increasingly using Big Data to help them manage risk, and also improve customer experience
- Commonwealth Bank of Australia has recently entered into a joint venture with Quantium
- Uses de-identified customer transaction data-sets to:
  - Perform analytics using AI to gain insights
  - Translate insights into action
  - Automate decision making

- Westpac and Microsoft have developed the Data Driven Experience Platform (DDEP), which is designed improve customer experience by:
  - Provide real-time, personalised insight into customers
  - Support decision making
  - Enhance customer interactions
  - Deliver personalised services

# External industry insights

## Big Data and Analytics in Tesla Inc.

Published on January 19, 2020




Bipin Karki
Research Assistant / Data Analyst at University of South Australia

1 article + Follow

https://www.linkedin.com/pulse/big-data-analytics-tesla-inc-bipin-karki/

## Focus on the Transport Sector

- Car manufacturers are increasingly using big data to enable the vision of ‘autonomous’ or ‘self-driving’ vehicles
- Tesla uses real-time analytics to process:
  - Adaptive cruise control
  - Emergency braking
  - Object detection
  - Collision evasion
- Tesla also uses fleet learning and deep neural network algorithms to train autopilot with collected real-world data

# External industry insights



| Sector | Uses of Big Data | Example companies | Learning opportunities for Energy Sector |
|---|---|---|---|
| Financial | Enhanced customer insights<br>Deliver personalised services<br>Inform and automate risk analysis and decision making<br>Perform analytics using artificial intelligence (**AI**) to gain insights | Commonwealth Bank of Australia, Westpac | Using AI to gain insights from disparate datasets<br><br>Deliver personalised energy services for consumers |
| Transport | Real time analytics to process:<br>• Adaptive cruise control<br>• Emergency braking<br>• Object detection<br>• Collision evasion<br>Fleet learning and deep neural networks to train auto-pilot systems | Tesla, Google Maps | Hazard detection – anticipate emerging local and system security risks<br><br>Optimisation of energy dispatch<br><br>Constraint and congestion management |
| Manufacturing | Workflow and process automation and optimisation<br>Enhance quality of products<br>Reduce equipment downtime<br>Optimise costs<br>Risk – reduction | Unilever, Schneider Electric, Volvo | Workforce and program management<br><br>Improve quality of power delivered (voltage, harmonics, %THD)<br><br>Improve asset management, predictive maintenance, inventory and procurement practices<br><br>Creation of 'Digital Twin' models |

# Recommendations

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| Dimension | Immediate - Now | Medium Term - 2023-2024 | Long Term - 2025+ |
|---|---|---|---|
| Technical | "Data Democratisation": identify opportunities to consolidate, share and use existing data sources within existing businesses and readily available analytical tools.<br><br>Review how machine learning and AI has been used in other industries and explore opportunities to apply learnings across organisations and the NEM.<br><br>Organisations to build business cases for programs to install monitoring for greater network visibility.<br><br>Enable trial, testing and demonstration of solutions like grid forming inverters, neighbourhood and grid scale batteries, demand response initiatives to gather data and learnings. | Identify opportunities to share data between network service providers (NSPs), the Australian Energy Market Operator (AEMO) and other bodies (Australian Energy Regulator, emergency services, local councils etc.) to increase situational awareness.<br><br>Commence trials and explore opportunities for machine learning and AI insights from other industries.<br><br>Establish Operational Technology (OT) platform for DNA facility, including data standards to ensure quality and consistency of data and security and privacy risks are mitigated.<br><br>Integrate new data from monitoring devices and third parties into existing data sources and analytical tools to improve decision making. | Implement DNA and continuously upgrade the system with the latest technology. |

# Recommendations

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| Dimension | Immediate - Now | Medium Term - 2023-2024 | Long Term - 2025+ |
|---|---|---|---|
| Workforce Capability | Review graduate programs and makeup of engineering vs data skills.<br><br>Develop future data skills resourcing strategy – “what skills do our people need to succeed in a digital future?”<br><br>Engage with universities to ensure students are graduating with entry-level data and analytics skills and investigate alternative skills pipelines e.g. ICT, Business, Economics. | Recruit data and digital specialists from external market.<br><br>Establish internal skills data development strategy & programs.<br><br>Intensive re-skilling programs for network technicians and controllers. | Industry to establish DNA Centre of Excellence to promote continued innovations in machine learning and AI. |
| Economic | Obtain funding from research bodies (Australian Renewable Energy Agency etc) to trial and pilot proof of concept cross-organisational data platforms. | Industry to collaborate with Governments and regulators around funding, operations and maintenance of DNA. | Agreed ongoing funding contributions from stakeholders to maintain and upgrade DNA platform. |

# Recommendations

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| Dimension | Immediate - Now | Medium Term - 2023-2024 | Long Term - 2025+ |
|---|---|---|---|
| Social | Identify and collate existing regulation and policy related to data management.<br><br>Organisations to begin developing a “data culture”.<br><br>Industry to collaborate with Governments and regulators around Digital Network Automation (DNA) strategy.<br><br>Organisations to establish internal comms to present vision and plan to workforce, and what the changes mean for them. | Develop stakeholder engagement plan and start public consultation to seek social licence for NEM data-sharing pathways.<br><br>Continue implementation of the “data culture”. Decisions based on data to be encouraged from the exec level down.<br><br>Engage with consumer groups and industry experts about cost and data privacy concerns. | Initiate NER Rule changes and other supporting legislation to support establishment of DNA platform.<br><br>Create and approve the data management regulation and policy for implementation. |

# Future/additional benefits

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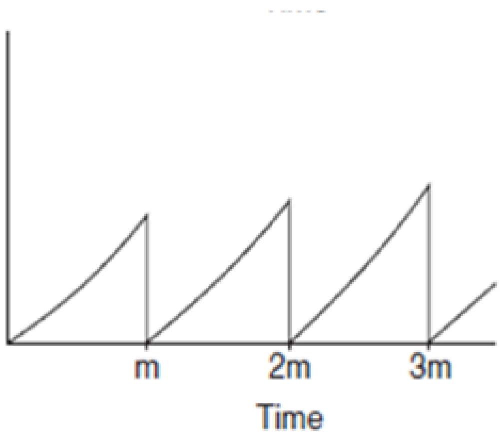
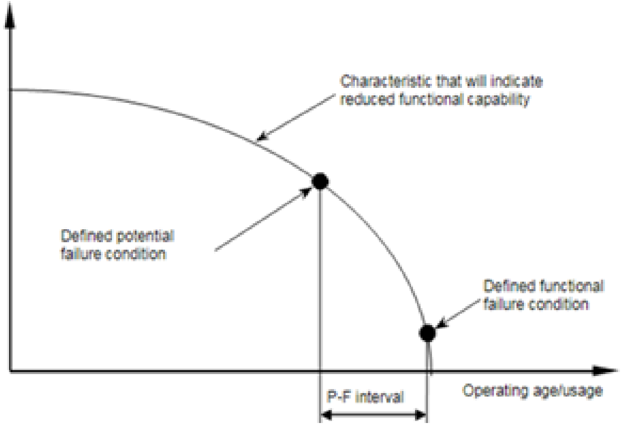
The Australian Power Institute

- Asset management evolution from time and condition-based to risk-based, leading to more efficient capital and operating expenditure

Increasing Maturity →

| Age or Time Based | Condition Based | Risk Based |
|---|---|---|
| Probability based<br>Uses Age data | Probability based<br>Uses Condition data<br>Drives Condition<br>Monitoring improvement<br>Reliant on detectability | Probability x Consequence<br>Uses "Big Data"<br>Leverages Analytical tools<br>Criticality based investment<br>Suggests Economic Actions<br>Enables optimisation |




| | Likelihood – Pr(fail) | | | | |
|---|---|---|---|---|---|
| Consequence – Effect | 22 | 23 | 25 | 25 | 9 |
| | 21 | 17 | 14 | 11 | 6 |
| | 20 | 16 | 12 | 8 | 3 |
| | 19 | 15 | 10 | 5 | 2 |
| | 18 | 13 | 7 | 4 | 1 |

# Future/additional benefits

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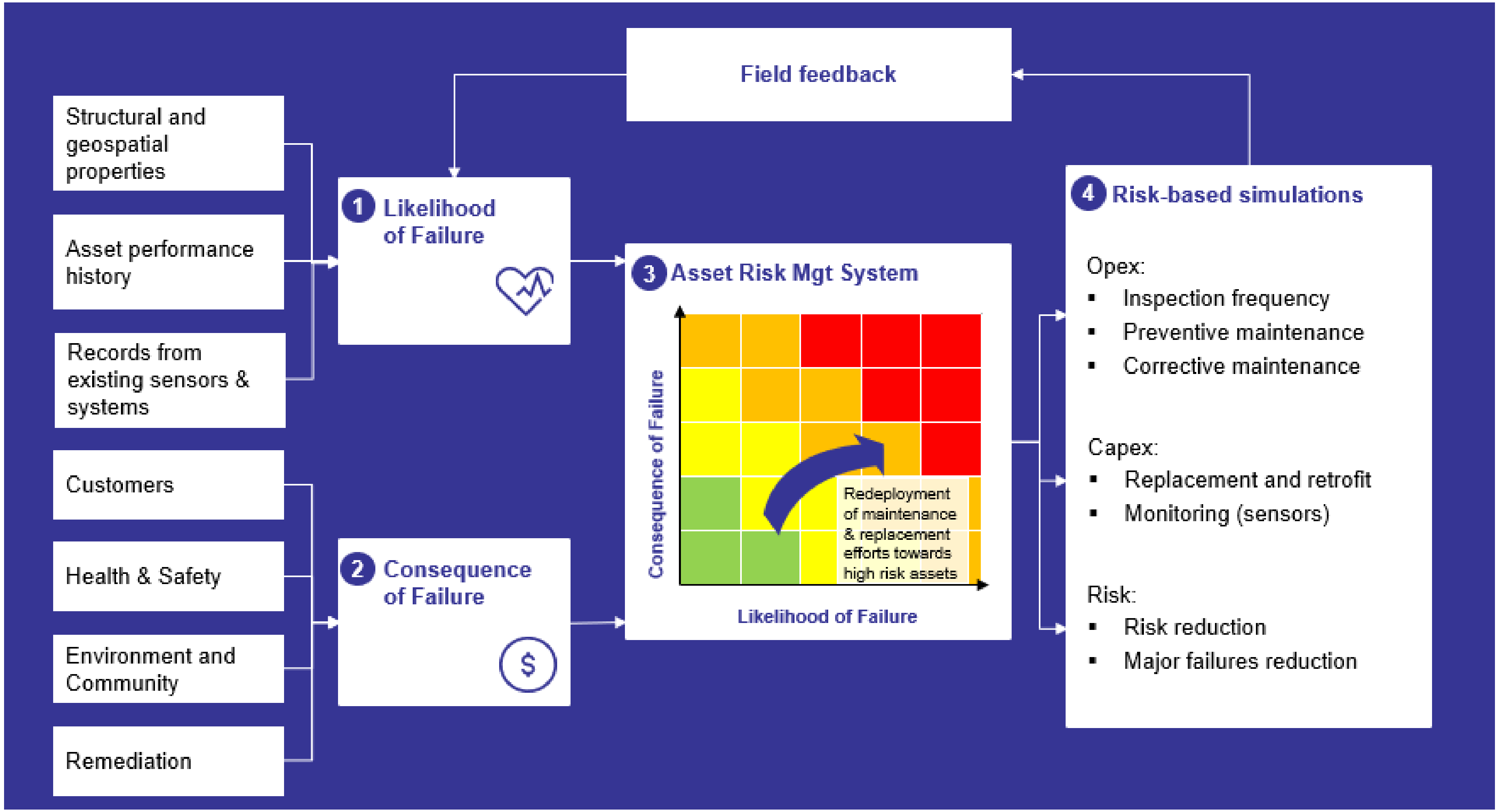
Use machine learning models to predict the likelihood of failure for a given asset within the next 12 months



# Future/additional benefits

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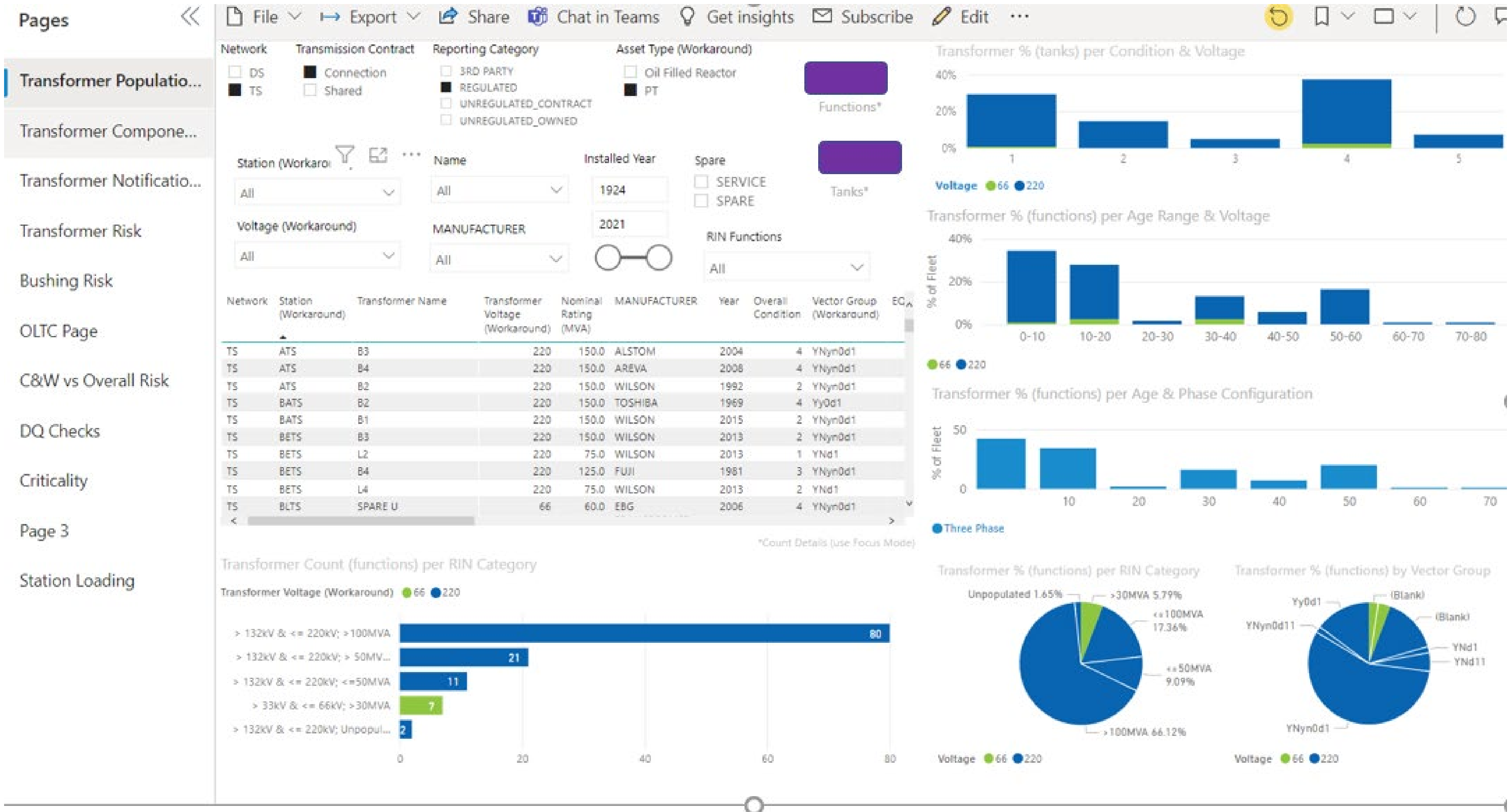
- Promote the corporate transparency to avoid silos and achieve maintenance & outage optimisation by connecting localised information to public dashboard



# Future/additional benefits



- Reduced effort and greater timelines of performance reporting, leading to improved decision making

  - **Robot uses predefined rules to move data from database/spreadsheet into SAP as measurement points**
  - **Actual data will be saved as measurement documents on SAP**
  - **IM Platform will extract the measurement documents for analysis and visualisation**