ICT and Cyber Security 101 Webinar

Dr Rob Nicholls

r.nicholls@unsw.edu.au

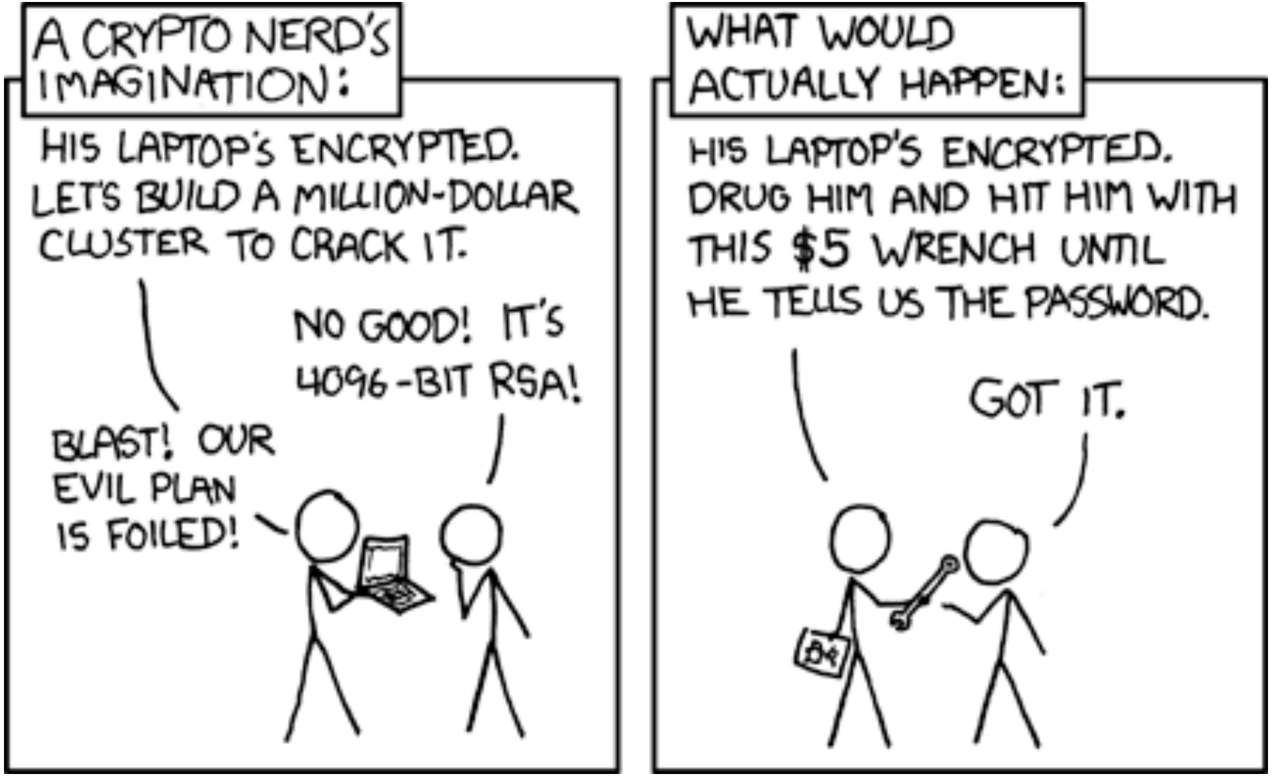
Aim

- shining a light on the drivers of cyber security costs
- discussing expected benefits for consumers from information and communications technologies (ICT) investment
- exploring the level, frequency and type of ICT investment
- providing a framework for how we can usefully think about uncertainty, costs and risks for consumers of ICT investment

Goal

To increase transparency around ICT costs. Build advocates' knowledge and capacity when engaging with network businesses, regulators and market bodies about ICT expenditure

Cyber security


A CRYPTO NERD'S IMAGINATION:
HIS LAPTOP'S ENCRYPTED. LET'S BUILD A MILLION-DOLLAR CLUSTER TO CRACK IT.
NO GOOD! IT'S 4096-BIT RSA!
BLAST! OUR EVIL PLAN IS FOILED!
WHAT WOULD ACTUALLY HAPPEN:
HIS LAPTOP'S ENCRYPTED. DRUG HIM AND HIT HIM WITH THIS $5 WRENCH UNTIL HE TELLS US THE PASSWORD.
GOT IT.

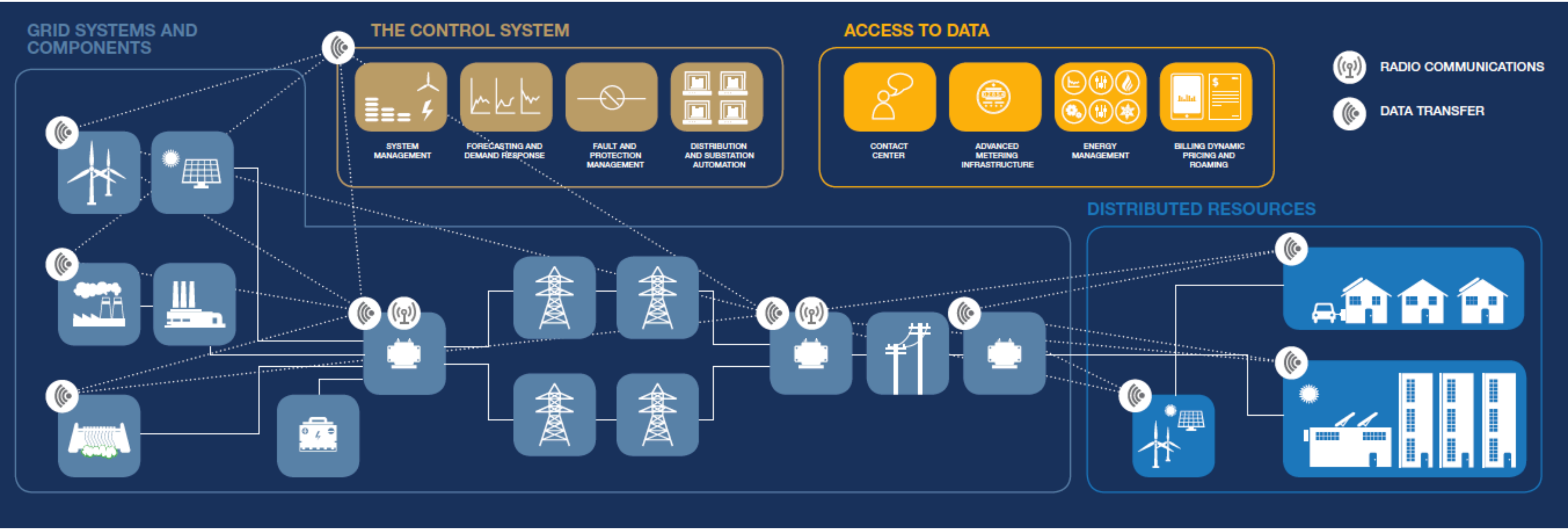
Cyber security

Threat	Desired property
Spoofing	Authenticity
Tampering	Integrity
Repudiation	Non-repudiability
Information disclosure	Confidentiality
Denial of Service	Availability
Elevation of Privilege	Authorisation

Cyber security issues

- What are the drivers behind cyber security costs, and do they apply to all networks (gas and electricity)?
- Do the same drivers impact other sectors? If so, what level of information can we expect to see in public facing information?
- What is the requirement for data security and how does this align with business models?

Cyber security: ENA and Standards ANZ


GRID SYSTEMS AND COMPONENTS
THE CONTROL SYSTEM
SYSTEM MANAGEMENT
FORECASTING AND DEMAND RESPONSE
FAULT AND PROTECTION MANAGEMENT
DISTRIBUTION AND SUBSTATION AUTOMATION
ACCESS TO DATA
CONTACT CENTER
ADVANCED METERING INFRASTRUCTURE
ENERGY MANAGEMENT
BILLING DYNAMIC PRICING AND ROAMING
RADIO COMMUNICATIONS
DATA TRANSFER
DISTRIBUTED RESOURCES

Cyber security: Is gas different?

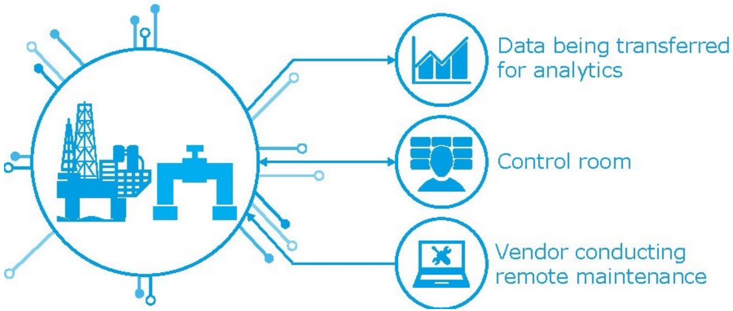
Information technology in the office domain

- Infrastructure and networks
- PCs, laptops, servers, databases
- Software applications (information systems)
- Information and data

Operational technology in the process control domain

- Safety and Automation Systems
- Industrial networks and infrastructure
- Software/Programmable Logic Controller
- Supervisory Control and Data Acquisition
- Data/information

Operational cyber threats and protection



Data being transferred for analytics

Control room

Vendor conducting remote maintenance

Processes

- Management systems
- Governance frameworks
- Policies and procedures
- Vendor/third-party contracts follow-up
- Audit regimes

People

- Training and awareness
- Professional skills and qualifications
- Emergency drills
- Authorizations and authentication
- Physical security

Technology

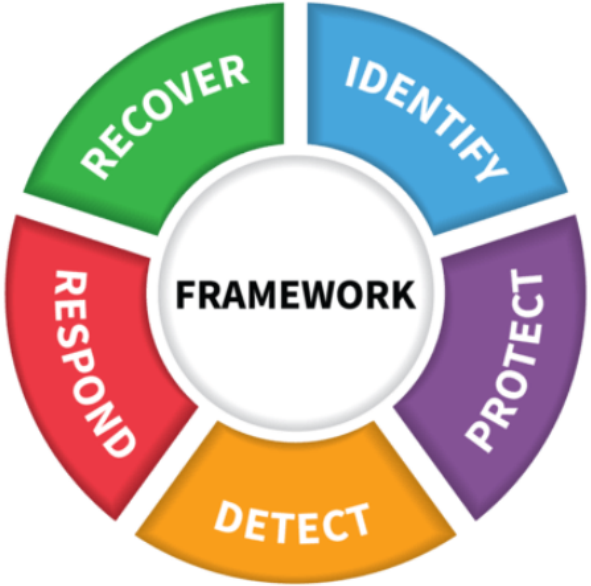
- System design
- Hardening of connections
- Software configuration
- Encryption protocols
- Jamming and spoofing
- Detection and monitoring

Effect in other sectors

- Energy networks have extensive outdoor plant
- Physical security is more complex than telco and more comparable to roads
- Compliance with Commonwealth and state (NSW, SA, Vic) requirements

The Five Functions

- Represent five key pillars of a successful and wholistic cybersecurity program
- Aid organisations in expressing their management of cybersecurity risk at a high level

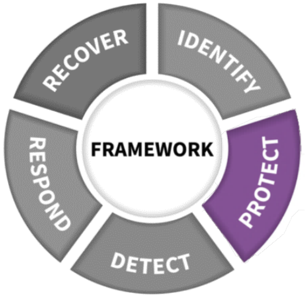


The Identify Function

IDENTIFY
PROTECT
DETECT
RESPOND
RECOVER
FRAMEWORK

- The Identify Function assists in developing an organizational understanding of managing cybersecurity risk to systems, people, assets, data, and capabilities
- Example Outcomes:
  - Identifying physical and software assets to establish an Asset Management program
  - Identifying cybersecurity policies to define a Governance program
  - Identifying a Risk Management Strategy for the organisation

The Protect Function



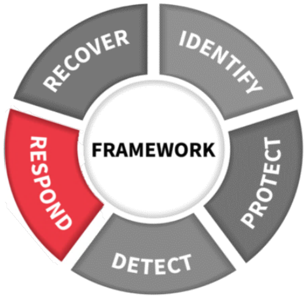
- The Protect Function supports the ability to limit or contain the impact of potential cybersecurity events and outlines safeguards for delivery of critical services
- Example Outcomes:
  - Establishing Data Security protection to protect the confidentiality, integrity, and availability
  - Managing Protective Technology to ensure the security and resilience of systems and assets
  - Empowering staff within the organisation through Awareness and Training

The Detect Function

FRAMEWORK
IDENTIFY
PROTECT
DETECT
RESPOND
RECOVER

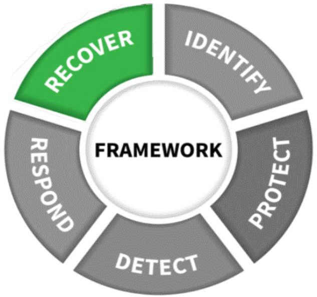
- The Detect Function defines the appropriate activities to identify the occurrence of a cybersecurity event in a timely manner
- Example Outcomes:
  - Implementing Security Continuous Monitoring capabilities to monitor cybersecurity events
  - Ensuring Anomalies and Events are detected, and their potential impact is understood
  - Verifying the effectiveness of protective measures

The Respond Function



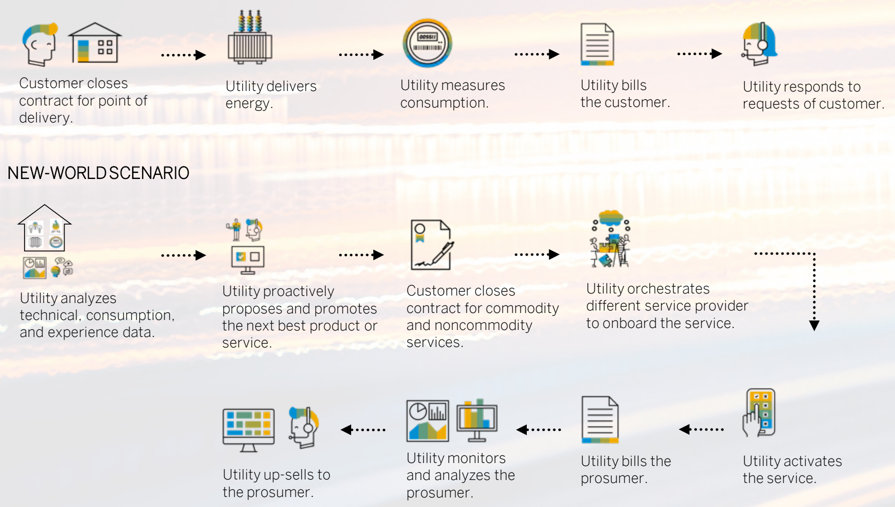
- The Respond Function includes appropriate activit take action regarding a detected cybersecurity incident to minimise impact
- Example Outcomes:
  - Ensuring Response Planning processes are executed during and after an incident
  - Managing Communications during and after an event
  - Analysing effectiveness of response activities

The Recover Function



- The Recover Function identifies appropriate activities to maintain plans for resilience and to restore services impaired during cybersecurity incidents
- Example Outcomes:
  - Ensuring the organisation implements Recovery Planning processes and procedures
  - Implementing improvements based on lessons learned
  - Coordinating communications during recovery activities

Information and communications technologies (ICT)


TRADITIONAL SCENARIO
Customer closes contract for point of delivery.
Utility delivers energy.
Utility measures consumption.
Utility bills the customer.
Utility responds to requests of customer.
NEW-WORLD SCENARIO
Utility analyzes technical, consumption, and experience data.
Utility proactively proposes and promotes the next best product or service.
Customer closes contract for commodity and noncommodity services.
Utility orchestrates different service provider to onboard the service.
Utility activates the service.
Utility bills the prosumer.
Utility monitors and analyzes the prosumer.
Utility up-sells to the prosumer.

POTENTIAL BENEFITS

10%–20%

Increase in revenue from new products

10%–20%

Increase in customer satisfaction

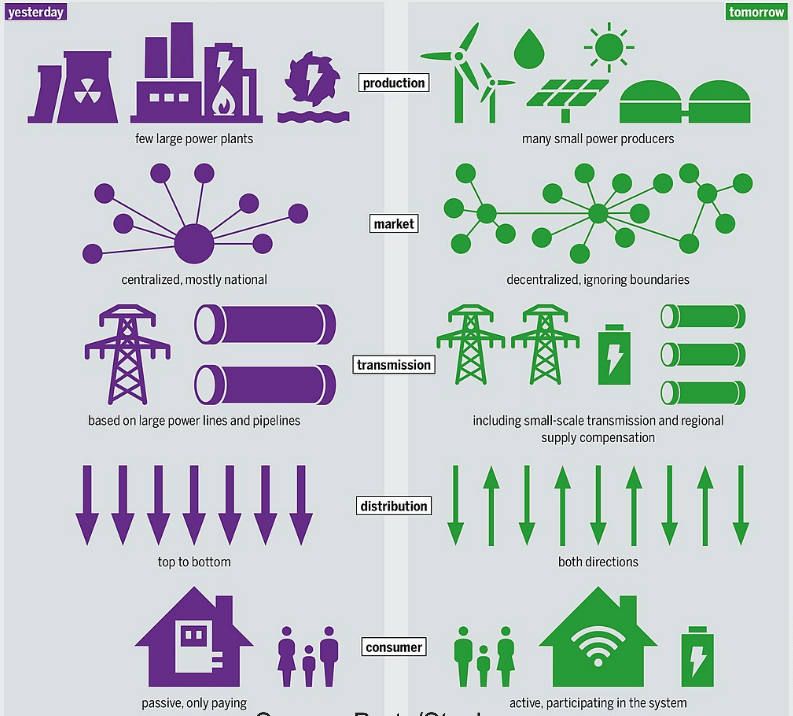
Source: SAP Performance Benchmarking

Energy utilities will turn into energy service companies that partner with customers to constantly optimize energy streams, decrease costs, and offer new products and services to prosumers.

Source: SAP

STAYING BIG OR GETTING SMALLER

Expected structural changes in the energy system made possible by the increased use of digital tools


yesterday
tomorrow
production
few large power plants
many small power producers
market
centralized, mostly national
decentralized, ignoring boundaries
transmission
based on large power lines and pipelines
including small-scale transmission and regional supply compensation
distribution
top to bottom
both directions
consumer
passive, only paying
active, participating in the system
© ENERGY ATLAS 2018 / 450CONNECT

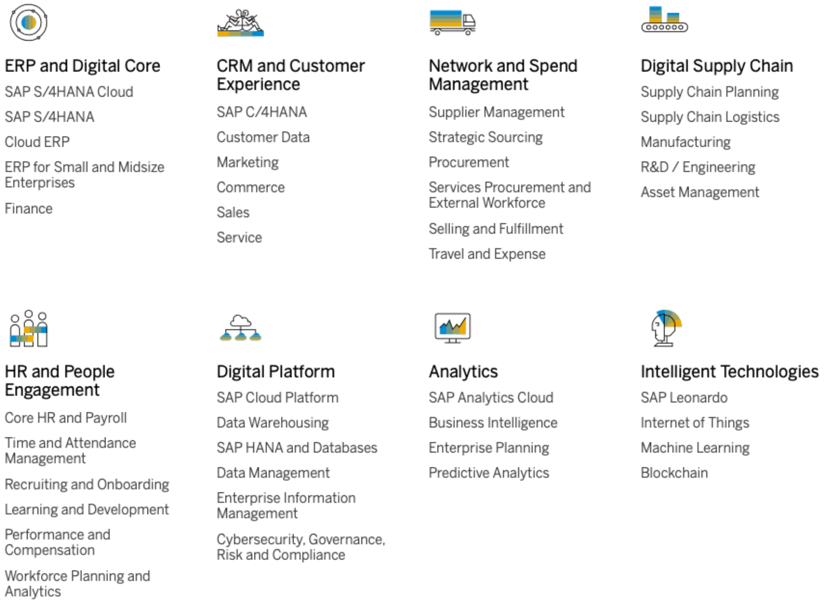
Source: Bartz/Stockmar

ENERGY CONSUMERS AUSTRALIA

UNSW | AGSM Business School

ICT in the Energy sector

- Use of Enterprise level software (Enterprise Resource Planning or ERP) to deal with all aspects of business
- Major ERP provider on a global basis is SAP
- SAP software is modular, but often customised
- Integration of business support systems (billing) and operational support systems (managing assets)



ERP and Digital Core
SAP S/4HANA Cloud
SAP S/4HANA
Cloud ERP
ERP for Small and Midsize Enterprises
Finance

CRM and Customer Experience
SAP C/4HANA
Customer Data
Marketing
Commerce
Sales
Service

Network and Spend Management
Supplier Management
Strategic Sourcing
Procurement
Services Procurement and External Workforce
Selling and Fulfillment
Travel and Expense

Digital Supply Chain
Supply Chain Planning
Supply Chain Logistics
Manufacturing
R&D / Engineering
Asset Management

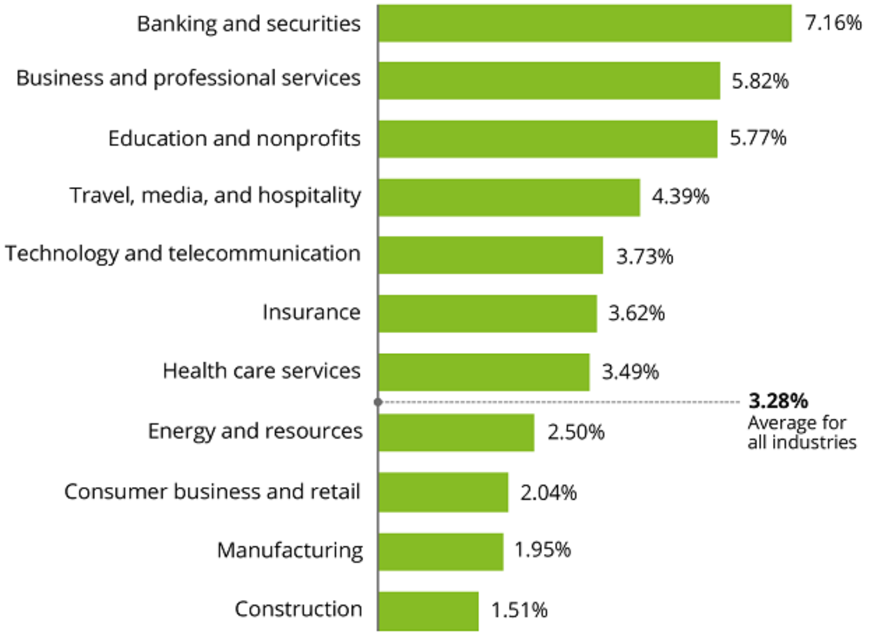
HR and People Engagement
Core HR and Payroll
Time and Attendance Management
Recruiting and Onboarding
Learning and Development
Performance and Compensation
Workforce Planning and Analytics

Digital Platform
SAP Cloud Platform
Data Warehousing
SAP HANA and Databases
Data Management
Enterprise Information Management
Cybersecurity, Governance, Risk and Compliance

Analytics
SAP Analytics Cloud
Business Intelligence
Enterprise Planning
Predictive Analytics

Intelligent Technologies
SAP Leonardo
Internet of Things
Machine Learning
Blockchain

ICT Budgets as percentage of revenue - global



Source: Technology Budgets: From Value Preservation to Value Creation / Deloitte Insights

ICT spend by energy companies

- So why is there so much variation?
- What is the money spent on?
- What do the life cycles of the different types of ICT investment look like?
  - Do upgrades result in benefits?
  - How do we know?
- What is the difference in approach between maintenance and upgrades?

Allocating benefits

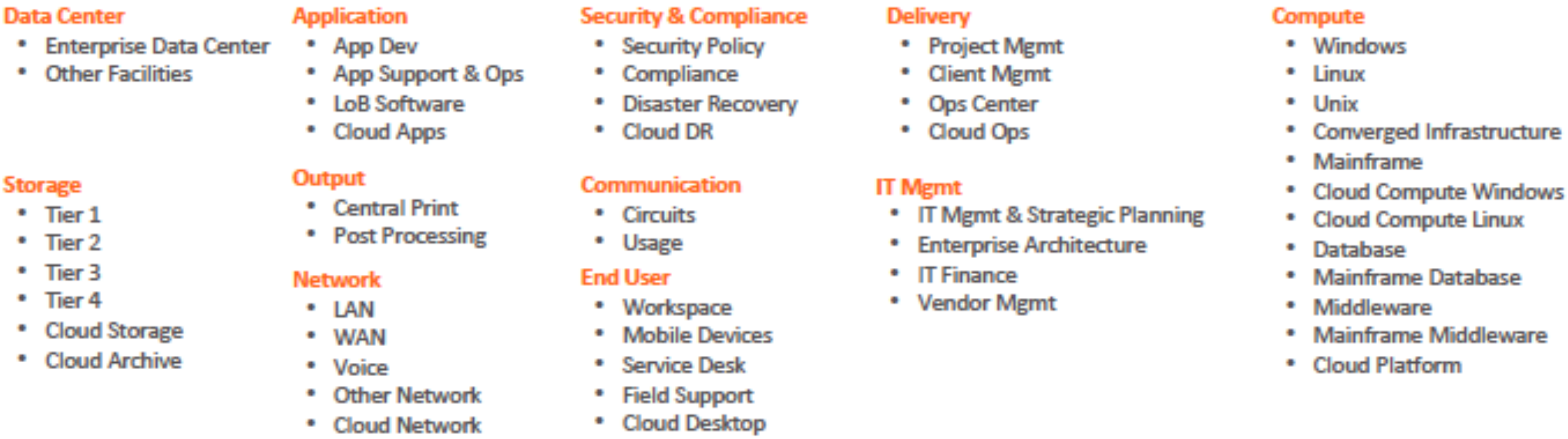
- Some businesses seek to recover the cost of ICT investment one of two ways:
  - Customers fund – we would expect to see benefits in opex reductions
  - Not claim capex on business improvements – we would expect to see savings in consumers' pockets.

ICT Classification

- Operational Technology and Infrastructure (**OTI**) or ICT expenditure?
- SCADA systems may need cybersecurity hardening – ICT or OTI?
- SCADA system may be replaced by an alternative ICT – ICT or OTI?
- It makes sense to seek standardised approaches to classification

ICT: Classification

- Need the tools of technology business management – e.g. WA Government:



Data Center
- Enterprise Data Center
- Other Facilities

Storage
- Tier 1
- Tier 2
- Tier 3
- Tier 4
- Cloud Storage
- Cloud Archive

Application
- App Dev
- App Support & Ops
- LoB Software
- Cloud Apps

Output
- Central Print
- Post Processing

Network
- LAN
- WAN
- Voice
- Other Network
- Cloud Network

Security & Compliance
- Security Policy
- Compliance
- Disaster Recovery
- Cloud DR

Communication
- Circuits
- Usage

End User
- Workspace
- Mobile Devices
- Service Desk
- Field Support
- Cloud Desktop

Delivery
- Project Mgmt
- Client Mgmt
- Ops Center
- Cloud Ops

IT Mgmt
- IT Mgmt & Strategic Planning
- Enterprise Architecture
- IT Finance
- Vendor Mgmt

Compute
- Windows
- Linux
- Unix
- Converged Infrastructure
- Mainframe
- Cloud Compute Windows
- Cloud Compute Linux
- Database
- Mainframe Database
- Middleware
- Mainframe Middleware
- Cloud Platform

This may not be granular enough!

ICT: Risks and Costs

- Critical issue is transparency
  - Does capex reduce opex?
  - Does opex reduce capex?
  - What is the flow through to pricing?
- Potential transparency tool is a formalised risk assessment

ICT: Regulatory driven expenditure

- The Australian Energy Market Commission's (AEMC) Five Minute Settlement Rule Change aligns operational dispatch and financial settlement at five minutes, reducing the time interval for financial settlement in the national electricity market from 30 minutes to five minutes
  - First operator ICT cost estimate is likely to be high
  - How can we usefully think about ICT cost uncertainty?
  - What types of evidence would we be looking for to be able to gauge how much it will truly cost?

Risk management to ISO 31000

Risk

- Almost certain
- Likely
- Possible
- Rare

Likelihood

- Very High
- High
- Medium
- Low

Consequences

- Extreme
- Moderate
- Low

Risk management to ISO 31000

- Extreme:
  - Action required: risks that cannot be accepted or tolerated and require treatment. That is, expenditure required
- Moderate:
  - Potential action: risks that will be treated as long as the costs do not outweigh the benefits. That is, expenditure requires justification
- Low:
  - No action: acceptable risks requiring no further treatment. That is, no expenditure required

ICT: Rationale

- The need for ICT expenditure requires transparency:
  - What is the problem?
  - How is the expenditure classified?
  - What is the risk being addressed?
  - In the case of regulatory driven expenditure, why is the cost to be borne by consumers?
  - What is the benefit?
  - How will that benefit be passed on to consumers?

UNSW SYDNEY Australia's Global University

ENERGY CONSUMERS AUSTRALIA

ICT and Cyber Security 101 Webinar

Dr Rob Nicholls

r.nicholls@unsw.edu.au

ENERGY CONSUMERS AUSTRALIA

UNSW AGSM Business School