ESO Technology Advisory Council

TAC-11

2nd June 2023

Meeting pack

TAC-11 agenda – 2 June 2023

Item	Start	Finish	Time	Item	Presenter	Notes
1	09:00	09:05	5	**Welcome & Apologies**	Vernon Everitt	
2	09:05	09:10	5	**Minutes of last meeting and matters arising**	Vernon Everitt	
3	09:10	09:15	5	**Feedback from the last meeting**	Vernon Everitt	
4	9:15	9:35	20	**Responses to TAC survey**	Cameron Shade	
5	9:35	10:05	30	**Digital Strategy update**	Gary White	
6	10:05	10:35	30	**Ways of Working**	Sangeeta Agrawal	
7	10:35	11:05	30	**Artificial Intelligence Centre Of Excellence**	Lyndon Ruff	
	11:05	11:25	20	**BREAK**		
8	11:25	11:40	15	**Open Balancing Platform Update & Roadmap**	Bernie Dolan	
9	11:40	11:45	5	**Subgroups update**	Vernon Everitt	
10	11:45	12:05	20	**Next meeting**	Vernon Everitt	Next meeting: Friday 1 Sept 2023
11	12:05	12:20	15	**AOB**	Vernon Everitt	

Welcome and apologies

Item 1

Vernon Everitt

Minutes of last meeting and matters arising

Item 2

Vernon Everitt

Minutes of last meeting and matters arising

- Minutes of TAC-10 are out for comment via circulation and will be published once agreed.
- The material from the meeting will also be published.
- This section will be used to discuss any matters arising.

Feedback from the last meeting

Item 3

Cameron Shade

Feedback from the last meeting

The topics discussed at the last meeting were:

- Digital Strategy
- Draft determination updates and the Ofgem reporting framework
- Open balancing platform – Progress update on PI 7
- Data Analytics Platform update

Feedback from the TAC:

Digital Strategy

- Timeline is too far in the future
- Options look sequential but are actually in parallel as you must always consider the future journey
- How will ESO integrate the FSO into the strategy?

Reporting framework

- What level of engagement have Ofgem had in the discussions?
- The framework refers to technology delivery not customer value
- The focus of the framework should not just be cost

Open Balancing Platform

- Happy to see products are rolling out after seeing earlier demonstrations
- Concerned certain experts are not included in all initiatives

Data Analytics Platform

- Congratulated the team on the pace quickly achieved and the great progress
- Suggestion to create an internal portal for interested parties to receive updates.
- Request to return in 2/3 sessions time.

Reponses to the TAC survey

Item 4

Cameron Shade

Survey responses

17 commitments to continue

2 Decisions not to continue (reactive technologies, sustainability first)

Various suggestions for additional industries / companies to join the TAC

2 Responses to be confirmed

1 Stepping down due to joining the ESO (Claudia)

Survey responses

Multiple Requests for occasional **in person meetings**

"It's great to see the continuing **willingness and openness** of NGESO to provide this forum and give us the chance to contribute to this journey."

More **frequent updates** from **Markets**

Key Survey Feedback…

Utilise TAC **more in an advisory** capacity before decisions

"Truly believe the only way to get to net zero electricity is to bring all the stakeholders along on the journey, and the ESO's **open and transparent approach**, with high data availability, pathfinders, and incorporating feedback, is **absolutely the way to go**."

More engagements between meetings via **subgroups** and deep dives

Consider how we can **utilise** other members of **your teams** effectively

Ability to **collaborate offline** – Slack / Teams / Notion / Linked

Digital Strategy Update

Item 5

Gary White

Topics to discuss

- Digital Skills and Culture
- Generative AI

Why we need this Digital Strategy

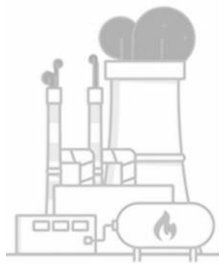
Collaboration with our stakeholders is the only way Great Britain can achieve its decarbonisation goals.

Against the backdrop of a cost of living crisis, the impacts of the war in Ukraine on security of supply and the huge strides still required to achieve net zero by 2050, the competing demands of the energy trilemma are evident.

The ESO must become an enabler to the new technologies and business models that will be essential to decarbonise the energy system by 2035 and achieve net zero by 2050.

	2024	2025	2030	2035	2050
UK Energy Industry		Operate a zero carbon system	Phase out the sale of new petrol and diesel vehicles	Fully decarbonised electricity system & 50% of electricity from renewable sources	GhG Net Zero UK
ESO/FSO	FSO transition	Interoperability and resilience across the energy system is possible through greater digitalisation	System balancing and stability actions are automatically deployed	Digitalisation is a fundamental part of the whole energy system as it enables greater market facilitation of flexibility actions	

Beyond decarbonisation, the industry is changing and the ESO must embrace the new paradigm



Consistent & controllable baseload of electricity

Limited need & desire for industry data

Slow & manual processes limit information sharing

Few assets & few market participants to regulate

Regulators ensure grid reliability & market fairness

Siloed analogue or manual control systems

Decarbonisation

Intermittent & variable renewable resources

Democratisation

Stakeholder decisions & innovations rely on industry data

Digitalisation

Overabundance of information in varying degrees of reliability

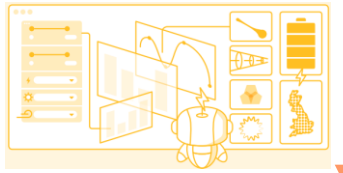
Decentralisation

More small assets & more industry stakeholders to manage

Policy & Regulation

Regulators drive market changes, innovation, investment, & consumer behaviour

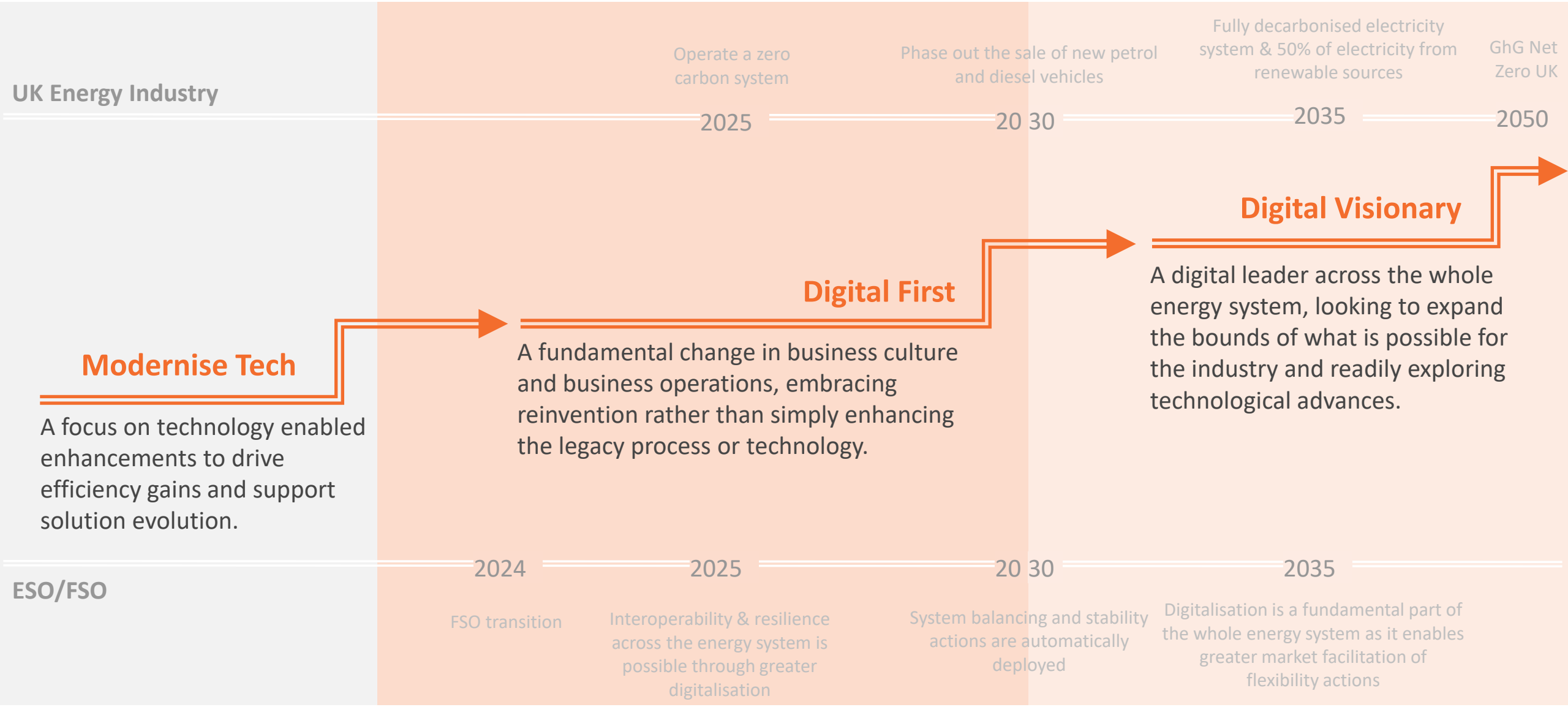
Technology



New opportunities for nteroperability in the way energy systems operate

The path forward is digital

Our data and technology need to evolve with the industry. The ESO's desired objective is to become a Digital Visionary organisation, but being Digital First is critical to achieving long-term ambitions.



Utilities: Cloud is the enabler, Data is the driver, and AI is the differentiator

CLOUD

Accenture's Future Systems research has revealed that **many utilities across the value chain are already on the cloud transformation journey.**

84%
have adopted cloud SaaS solutions

79%
have adopted cloud PaaS solutions

ONLY
20-40%
of workloads exist in the cloud

Nearly all industry leaders surveyed have implemented cloud solutions, **while less than 50% of lower performing utilities have taken advantage of cloud.**

Research has shown whilst cloud adoption is on the rise, **the predominant use cases are for data storage & analytics.**

This is expected to evolve with **more computing and processing shifted to cloud.**

DATA

Harnessing the enterprise value of big data is a catalyst for any type of digital transformation.

ONLY **1 in 5**
companies excel at maximising value from data

OVER **30%**
annual growth experienced by data-driven organisations

ONLY **20%**
have a data strategy that allows collaboration seamlessly across the ecosystem

OVER **48%**
of employees indicate they tend to follow their gut instinct rather than relying on data-driven insights

OVER **48%**
expect to be able to unlock broader data collaboration by 2024

ONLY **37%**
of employees have greater faith in decisions when they are based on data

AI

We have reached the tipping point with the open emergence of generative AI models.

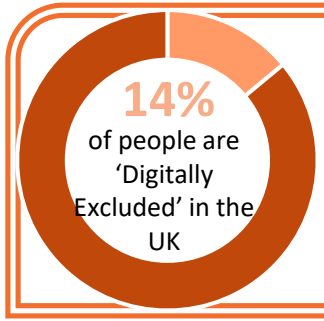
98%
of global executives agree AI foundation models will play an important role in their organisations' strategies in the next 3 to 5 years.

40%
of all working hours can be impacted by large language models (LLMs) like GPT-4, DALL-E, etc...

Emerging Utilities Use Cases for Generative AI

- *Digital Assistants – Decision Triage*
- *Automated Grid Balancing*
- *Risk Management & Modelling*
- *Co-Pilot Next Best Action*
- *Optimisation Engines*
- *Network Planning & Simulation*

DIGITAL SKILLS AND CULTURE



Digital Exclusion in the UK

- Based on a nationally representative sample, a recent survey explores digital exclusion as a combination of technology access and skills confidence
- It finds that 14% of people might be affected and that it disproportionately impacts some groups more than others.

54%
Of leaders believe they have strong low-carbon and digital skills (vs. 16% of laggards).

38%
Of leaders believe they have strong data and analytics skills (vs. 15% of laggards).

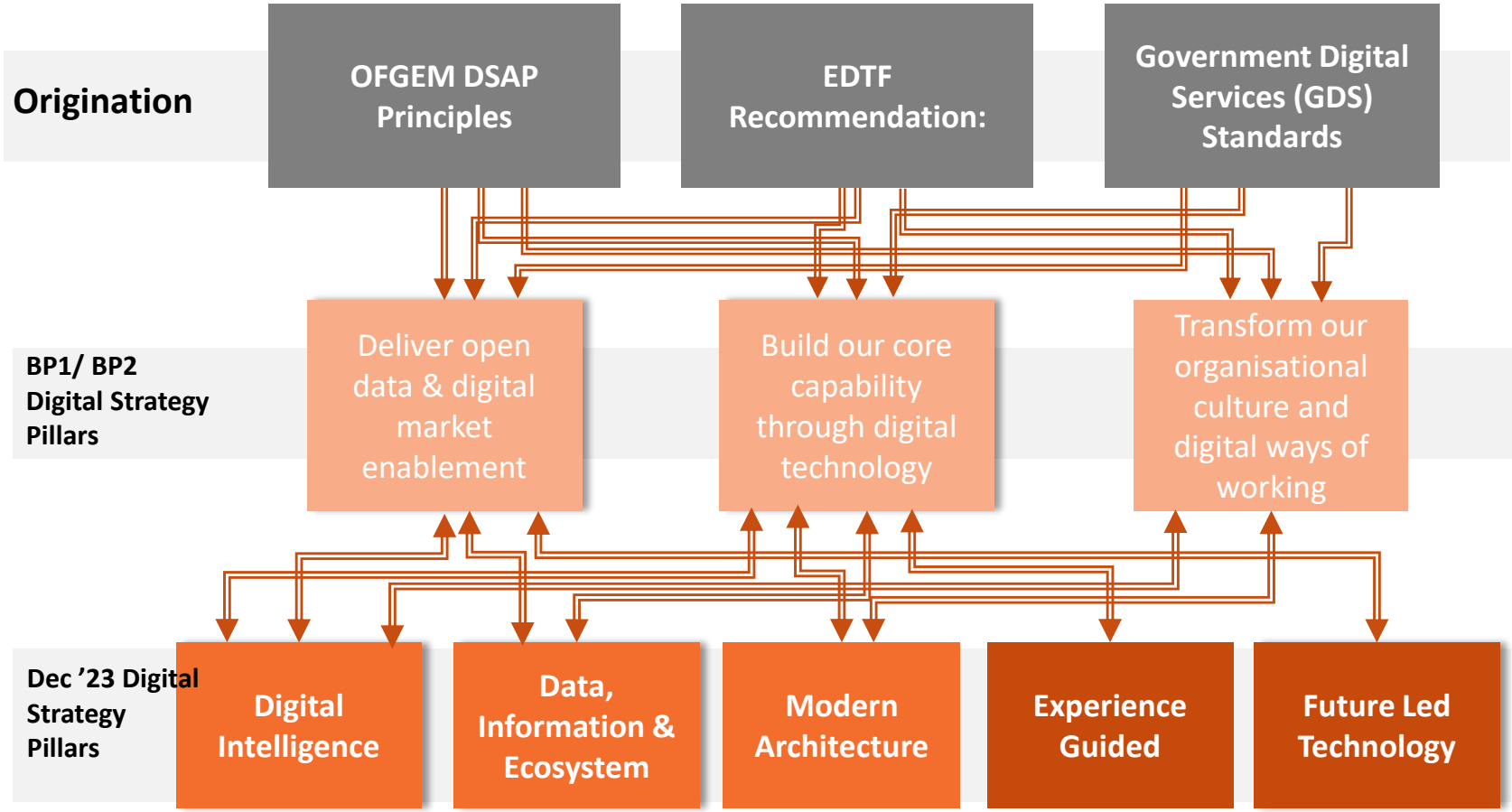
31%
Of leaders believe they have strong customer engagement skills (vs. 7% of laggards).

Leaders believe their actions to strengthen Culture will yield a positive result. All of them expect their initiatives to produce **a 20 percent boost in employee satisfaction**. And **96 percent anticipate a 20 percent improvement in productivity**.

How our Digital Strategy is evolving to be Digital First

In response to Ofgem's seven Digitalisation Strategy & Action plan principles, the EDTF's recommendations and the Government's Digital Services (GDS) standards, the strategic pillars were developed and aligned to the core delivery roles that have been used since 2019.

A detailed analysis of these pillars and our accompanying Digital Strategy Action Plan's found that their broadness was outdated and should be refined to more accurately reflect the ESO's changing role in the energy sector.



A day in the life in Role 1: Control Centre Operations

ESO Network Controller

Network Controllers at the ESO monitor and control power generation, transmission, and distribution equipment to ensure that electricity is [illegible] safely, reliably, and efficiently to customers.

	Shift Change Meeting 0800	Send Generator Dispatch Instructions 0830	Incident Response 0900	Trial Run of New Net Zero Process 1030	Meeting with Intraday Trader 1130	Update Fault Modelling	Planning 1330	Connections Meeting with Network Planning 1530	Develop CRAIG Log for Next Shift 1600
Actions	Discuss the current happenings across the system and the outlook for the next 12 hours	Analyse price and resource availability to develop an optimised plan for the system for the day and send instructions to each generator to precisely control [illegible] output to [illegible]	Respond to a Generator trip? Not clear on what incident response looks like	Test new services and contingency plans that ha[illegible] been [illegible] resource [illegible]iability requirements for 2025 Zero Carbon System goal	Flag [illegible]emand [illegible]ncern to trading team for mitigation by intraday trade execution	Determine and document how power flows are expected to change as known generation, demand, and outages will be occurring across the network	Analyse and provide an indication of likely-to-proceed outages planned for the next day	Discuss the network implications of new connections requests with Network Planning team	Aggregate information on current system events and performance and develop an outlook for the next 12 hours
Tools & Processes	• CRAIG Log	• [illegible]MS • Data Historian • EBS • Generator Uncertainty Model	• iEMS • Data Historian • Ancillary Service Dispatch Platform	• iEMS sandbox?	• Data Historian	• iEMS • Offline What-if scenario analysis tool • Picasso (guidance document)	• iEMS	• iEMS	• Word

Potential Enhancements

Modern Architecture
- TBC?

Experience Guided
- Self-service connections implication information

Digital Intelligence
- AI Generated CRAIG Log
- AI recommendations for incident response

Future Technology Led
- Virtual Energy System leveraged for trials of new processes

Data & Information Ecosystem
- Open data access to generator performance

Discussion:

DIGITAL SKILLS AND CULTURE

How are you developing digital culture and behaviours across your organisations

What are the blockers you see to progress

Have you assessed the maturity of your digital culture and behaviour
- How did you do this
- What were the findings

Generative AI

What are your organisations views of Generative AI

What opportunities do you see

What are the blockers to adoption

Ways of Working

Item 6

Sangeeta Agrawal

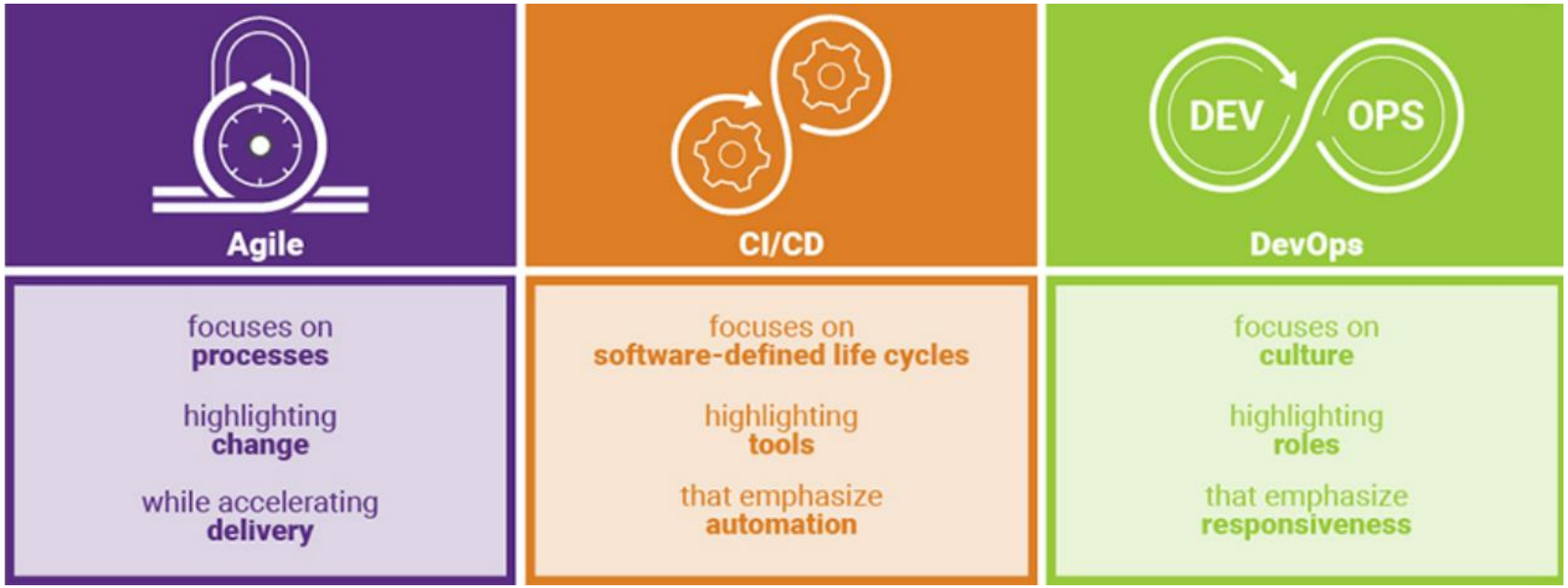
Topics to discuss

- Discuss why and how we are (re)defining ways of working and take you through our execution approach
- Seek feedback on the framework we are leveraging and organizational shifts that we are making.
- What are the critical success factors and challenges of implementing Agile DevSecOps delivery model in your business processes and operations?
- What are the best practices and tools for shifting mindset and creating a culture of continuous learning and collaboration in your organisation?

Ways of working – (Re)defining and alignment of the focus

Purpose & Goal: Our purpose is to shift the digital organisation from traditional waterfall and big-bang releases to iterative and quality engineering delivery. This will ensure that we add value to the customer as per our commitment and at pace with quality and reliability.

Why we are (re)defining Ways of Working: In the current strategy, the focus of 'Ways of working' has been purely on Agile which hasn't helped us achieve above objectives. In our revised approach, we are bringing Agile, CI/CD and DevOps frameworks together with focus on Engineering excellence and identifying and making interventions at program and systemic level through a 'Route to Live' transformation squad. This will enable us to achieve pace, quality and reliability in our delivery.

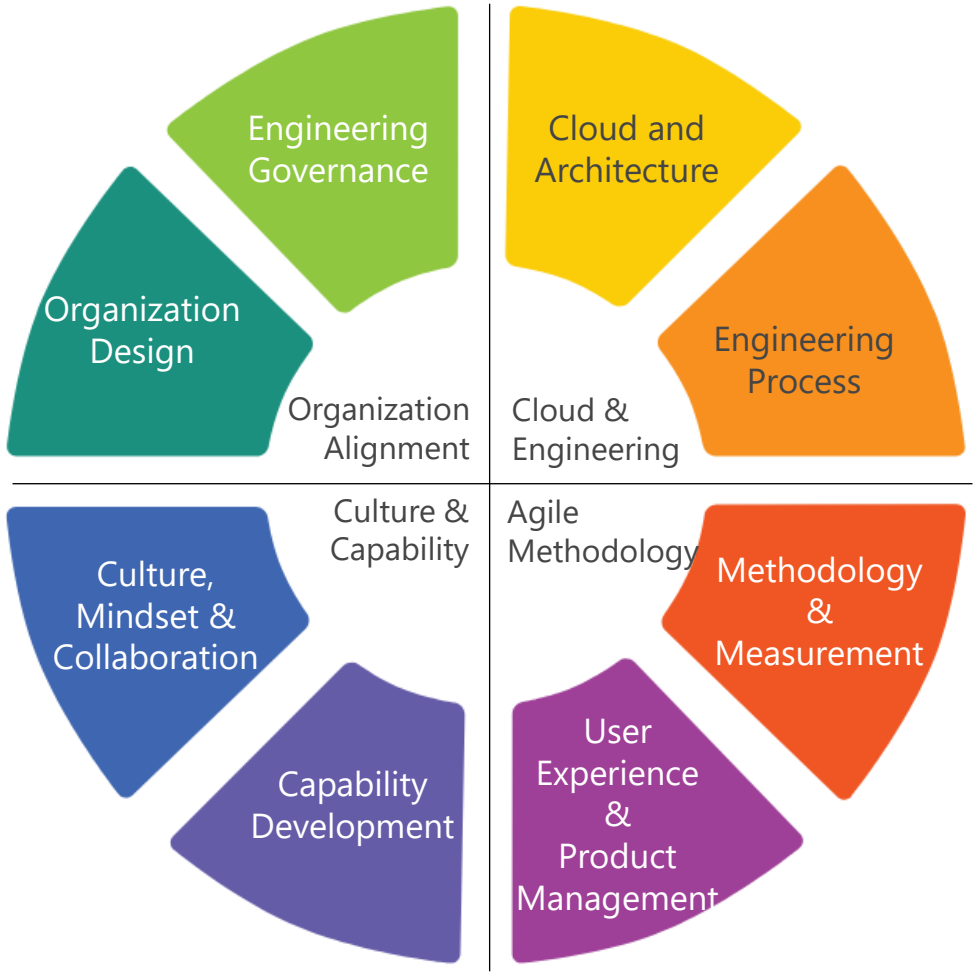


What is Ways of working

Organization alignment

It is essential that organization adjusts to support through governance, org design and value driven OKR.

Change in operating model to create cross-functional and multi-disciplinary teams. Org objectives are driven by outcomes not output.



Cloud & Engineering

Core of the work where interventions are applied across applications, DevSecOps, Quality engineering, automation, Developer experience.

Relentless focus on quality engineering enabled through automation and cloud platform.

Culture & Capability

Ensures that the organization is capable of operating in the new ways of working in a sustainable way.

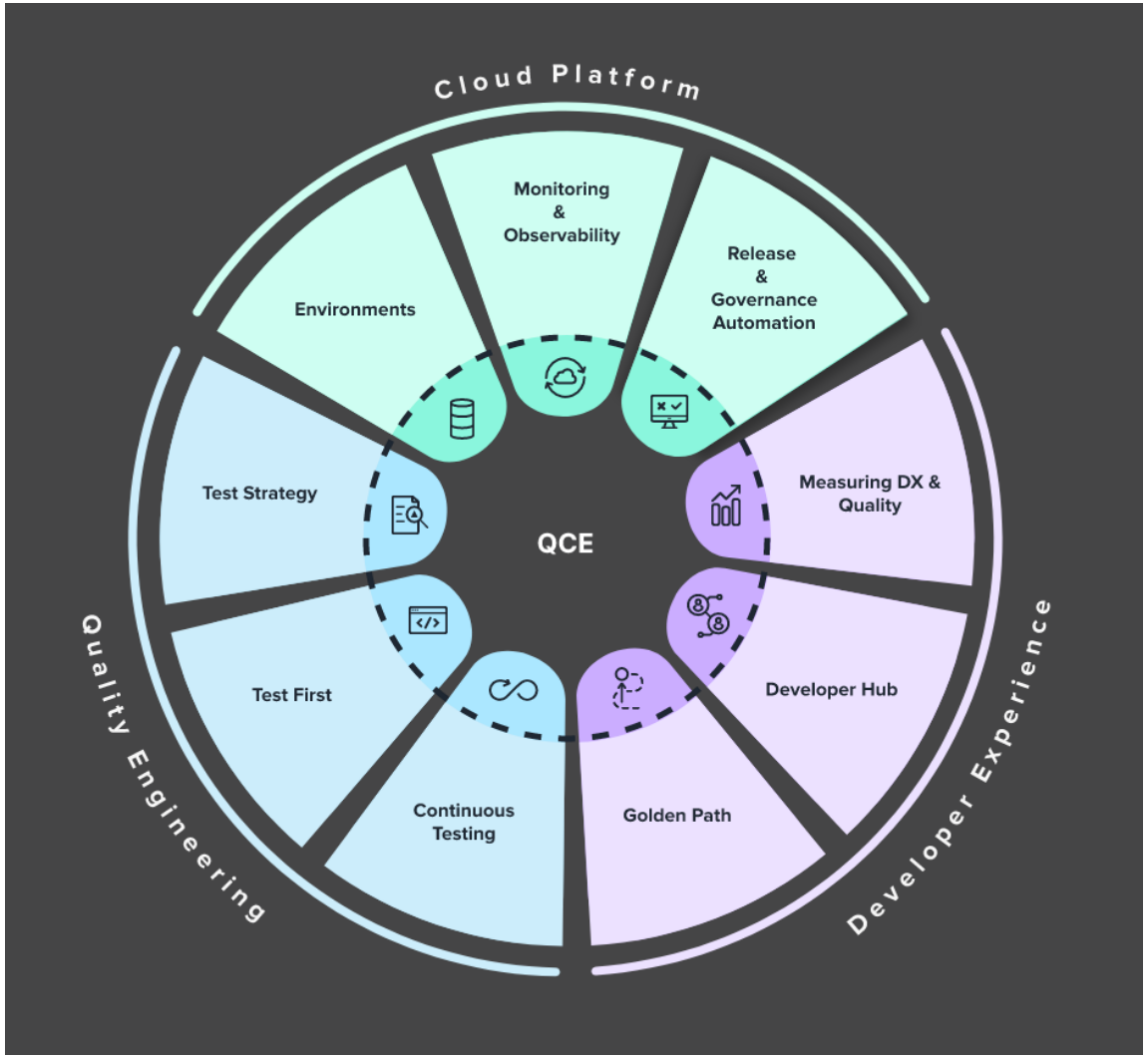
Capability development of people who will have digital mindset, collaborative culture and skills in place to adopt new ways of working.

Agile Methodology

Keeping customer at the heart for prioritization and design through close collaboration with business.

Measure everything and apply relentless focus on improvement with continuous feedback loop in place across the team.

Deep Dive: Agile DevSecOps Engineering Framework



Quality Engineering

- Iterate and improve frequently
- Operate a reliable service
- Create a secure service which protects users' privacy

Cloud Platform

- Iterate and improve frequently
- Operate a reliable service
- Choose the right tools and technology

Developer Experience

- Have a multidisciplinary team
- Use agile ways of working
- Iterate and improve frequently
- Define what success looks like and publish performance data
- Choose the right tools and technology
- Make new source code open
- Use and contribute to open standards, common components and patterns

Case in point - Connections

Through relentless focus on quality engineering and close collaboration between Digital and Business, Connections project achieved a turn around from at risk to successful go-live in March as per the commitment. We aim to achieve similar shift across the portfolio.

Ways of working – Quality Engineering & Collaboration

Test first approach to radically improve code quality and reduce defect rate.

Defining, managing and delivering to the scope through close collaboration with business stakeholders.

Aligning the roles and goals of the whole team including business stakeholders as ONE TEAM.

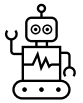
Relentless focus on automation, measurement and continuous improvement

Tracking success

Value delivered to customer: Ontime value delivered to the customer as per the commitment

Release predictability: From one release in 12 months to 3 on time releases in 3 months

Quality: From 17 Critical defects to 0 defects.

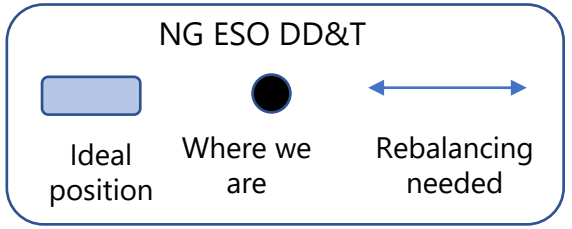


Automation: 95% regression test automation and 100% automated code quality check.

Team velocity: 50% increase in Team velocity – Story points delivered.

Team happiness and well being: Improvement in Team happiness and well being.

Shifts required



Culture

Siloed → Collaborative

Blame culture
Hierarchical decision making
No feedback loop

Decision making at the point of knowledge
Continuous learning
Experimental and innovation thinking

Automation

Manual processes → Automated Workflows

Slow release cycle
Inconsistent approach
Human errors

Infrastructure as code
CI/CD Pipeline
Automated testing

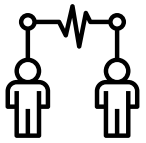
Measurement

Intuitive decision making → Data driven decision making

Reactive problem solving
Lack of performance understanding
Inconsistent KPIs

Regular metric reviews
Proactive issue detection and resolution
Transparency on performance status

Sharing



Information hoarding → Knowledge sharing

Isolated innovation
Lack of sharing of success and failures
Re-inventing the wheel

Open communication and collaboration
Seamless cross team collaboration
Continuous learning and improvement

AI CoE (Skills & Capabilities)

Item 7

Lyndon Ruff

Topics to discuss…

- What strategies do you use to allocate time and resources for employees to pursue self-development opportunities in your organisation?
- How do you assess the data science skills and needs of your employees and match them with the needs and outcomes of the business and end customers?
- What are the best practices and tools for creating a continuous learning and innovation culture in your organisation?
- What are the most effective schemes or incentives you have employed to motivate and reward employees for upskilling in data science?
- What are the critical success factors and challenges of implementing AI solutions in your business processes and operations?

The ESO AI Centre of Excellence (AI CoE)

Issue Data science and AI skills gap widening within the energy industry

CAUSES

Changing Market Demand

- Demand for data skills in the UK is outpacing the supply, as more companies adopt a data-driven approach.
- The need for data-driven decision-making is growing as the volume of data expands and technology advances.
- High variance in pay between Big Tech and Energy companies

Changing Energy Landscape

- Complex energy industry in GB
- Fragmented understanding of how the industry works
- Transition to whole system approach, including evolving role of ESO

Data Science Maturity

- Demonstrating the impact of data science efforts within an organisation is more likely to attract top talent.
- ESO is not currently able to fully exploit the opportunities presented by data science.
- Low data skills maturity which applies to a variety of data roles

EFFECT

1. ***Talent Stagnation****: Lack of diversity in talent and data science skills shortage*
2. ***Attrition Rates:*** *Increasing our risk of losing talent to other organisations; and*
3. ***Innovation Slow Down:*** *ESO business left behind on the ability and promise to innovate advanced analytics products to benefit the whole energy system*

The ESO AI Centre of Excellence (AI CoE)

Our Vision

To unify and grow a collective AI workforce in the energy industry to decarbonise the whole system through digitalisation by creating a collaborative space where people can apply their skills to help meet net zero targets, discover, learn and contribute positively towards improving society and saving our planet.

Academy — Equipping data scientists with necessary skills through training, talent pipelines, and university degrees

Library — Promoting collaboration, innovation, and efficiency through shared best practices, code repositories, and industry knowledge.

Resource Market — Providing a platform for data and resource exchange to solve BAU problems effectively.

Resource Exchange — Establishing secondment, placement, and internship programs to expand skills and identify future talent.

Innovation Lab — Creating a safe space for data scientists to develop and test AI solutions before deployment.

What have we done & What's next?

To unify and grow a collective AI workforce we have…

Success highlights

- ✓ Delivered a Use Case Framework with a backlog of 107 use case opportunities for ML/AI; scored and prioritised (including alignment to BP2)
- ✓ Established a partnership framework for engaging with various partners.
- ✓ Baselined the skills, capabilities and capacities of ESO. Identified capability gaps and opportunities
- ✓ Designed the desired operating model for AI CoE implementation and initiated capability development to support the implementation of the op-model
- ✓ Designed and planned the implementation of an AI knowledge hub for sharing best practices and resources

What's next?

Delivering Business Value

- **Use case 1 – Balancing cost reduction** – development and deployment of a tool to forecast balancing costs and facilitate outage optimisation planning and constraint forecasting to reduce costs.
- **Use case 2 – Fast Outage Assessment** - Rapid first-pass assessment of outages will narrow search space for subsequent simulation, allowing per-outage decisions to be made more quickly.

Building Capabilities

- **Knowledge hub** – Set up architecture, curate and upload content and associated metadata and usage guidelines. Facilitate introductions to the platform and stimulate and monitor usage and engagement activity.
- **Academy** – the creation of development pathways and associated training courses (e.g., system dynamics, best practice modelling etc.) for the data science community to enhance AI delivery.

Boosting Capacity

- **Hackathon** – We will use a best-in-class global platform to host a machine learning competition and connect with hundreds of data science experts who may be unaware of the ESO and can help solve this business-critical issue.

Questions for The ESO Technology Advisory Council (TAC)

We are in the process of shaping our future and how we can deliver it…

1

People Development

What strategies do you use to allocate time and resources for employees to pursue self-development opportunities in your organisation?

2

Skills Assessment

How do you assess the data science skills and needs of your employees and match them with the needs and outcomes of the business and end customers?

3

Culture Building

What are the best practices and tools for creating a continuous learning and innovation culture in your organisation?

4

Motivation

What are the most effective schemes or incentives you have employed to motivate and reward employees for upskilling in data science?

5

Delivery Challenges

What are the critical success factors and challenges of implementing AI solutions in your business processes and operations?

Break

11:00 – 11:20

Open Balancing Platform Update & Roadmap

Item 8

Bernie Dolan

Progress Update on OBP – Release 1.0

- Following the principles of Scaled Agile the new Open Balancing Platform is being developed using Program Increments (PIs)
- We have now completed PI7 (in April) and are now into PI8
- During PI10 we will make our first production release (Dec 2023)

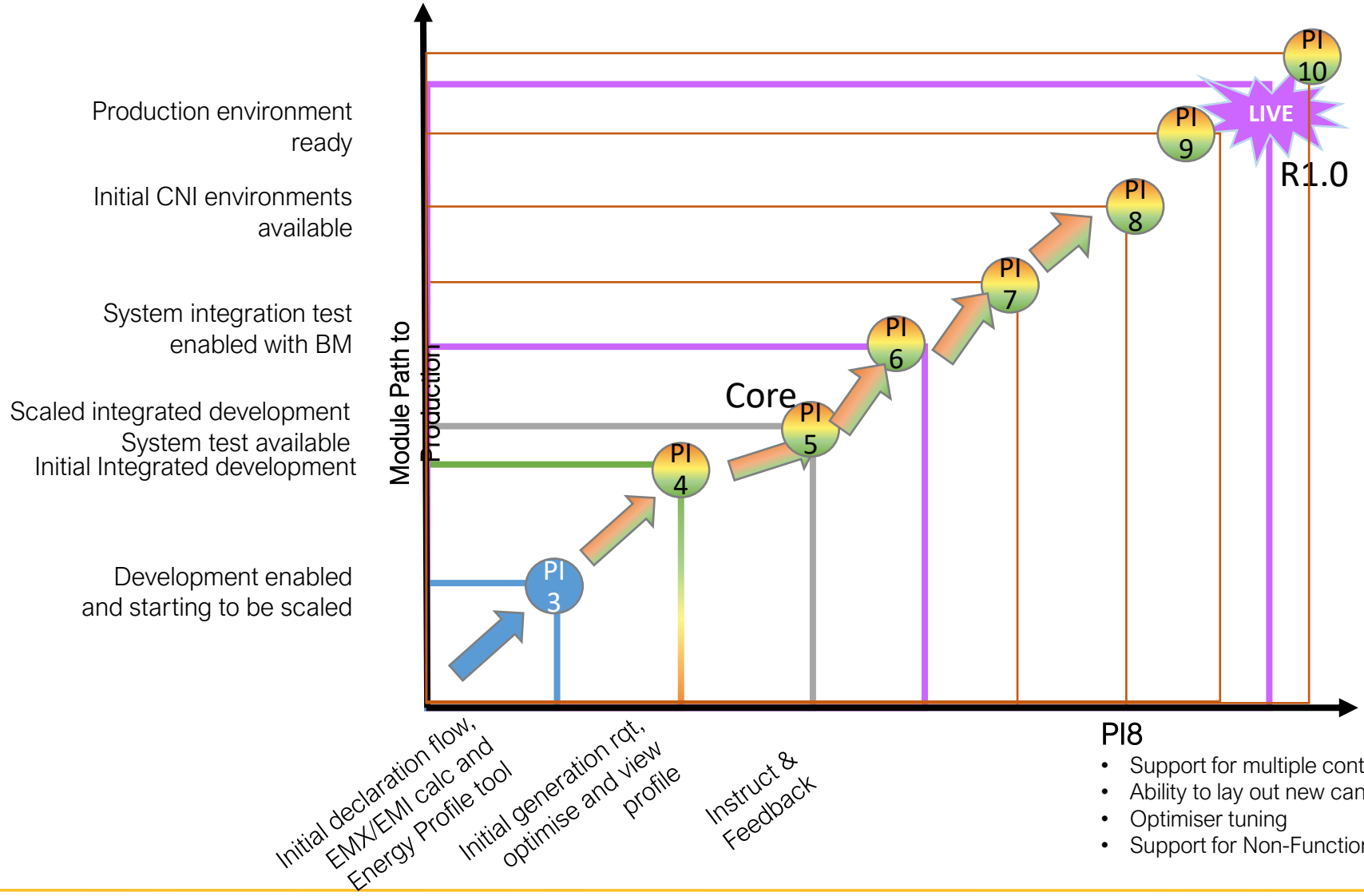
GOAL

A Zonal Balancing Engineer will be able to bulk dispatch fast acting units (“Small BMU” zone) without breaking constraints

Benefits

Reduction in skip rates , better economic decisions, reduced workload in the control room

PI7 Complete, Started PI8

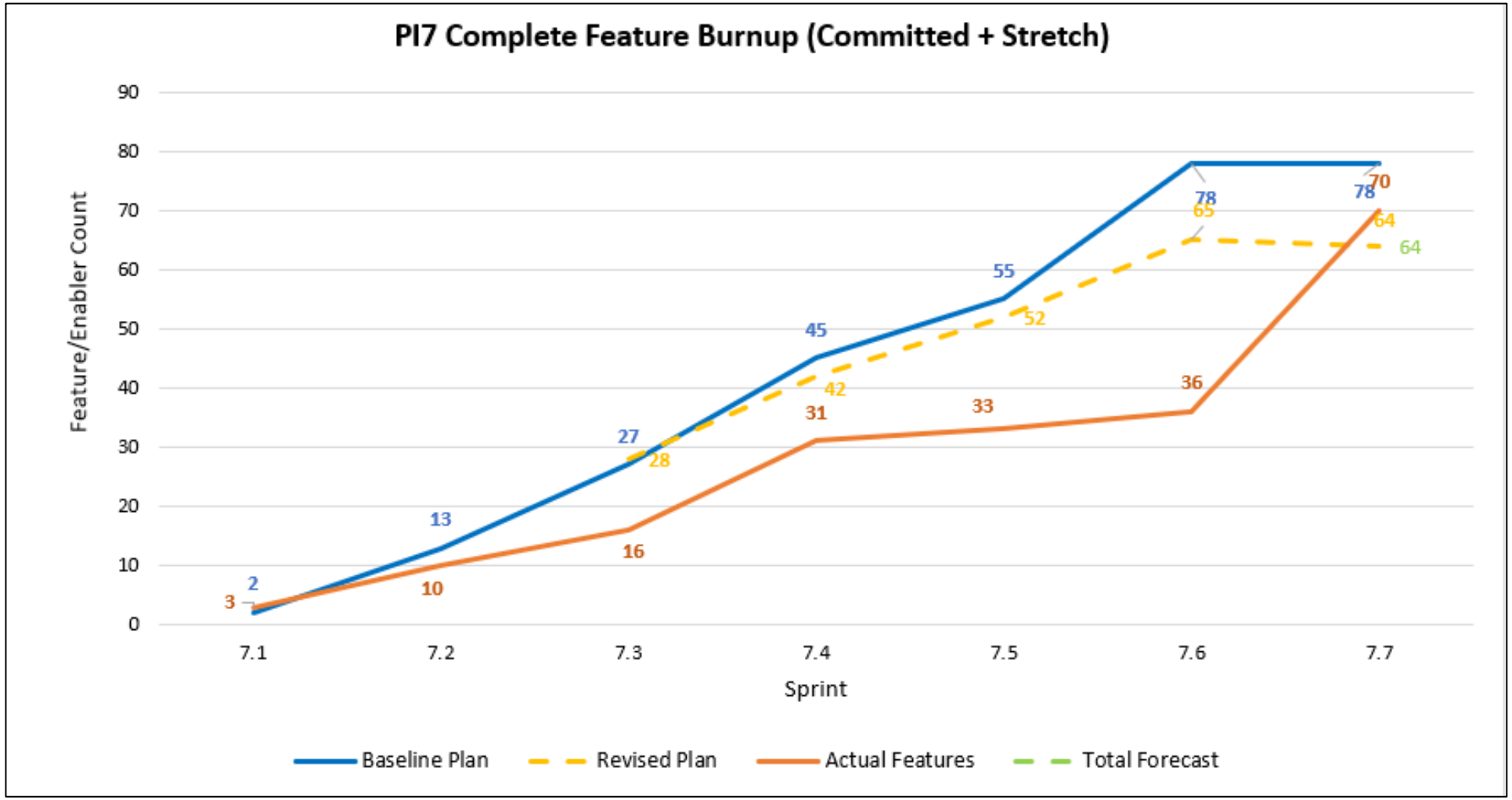


Each PI will need to develop new functionality and bring previously developed functionality in line with latest DevOps and testing capability

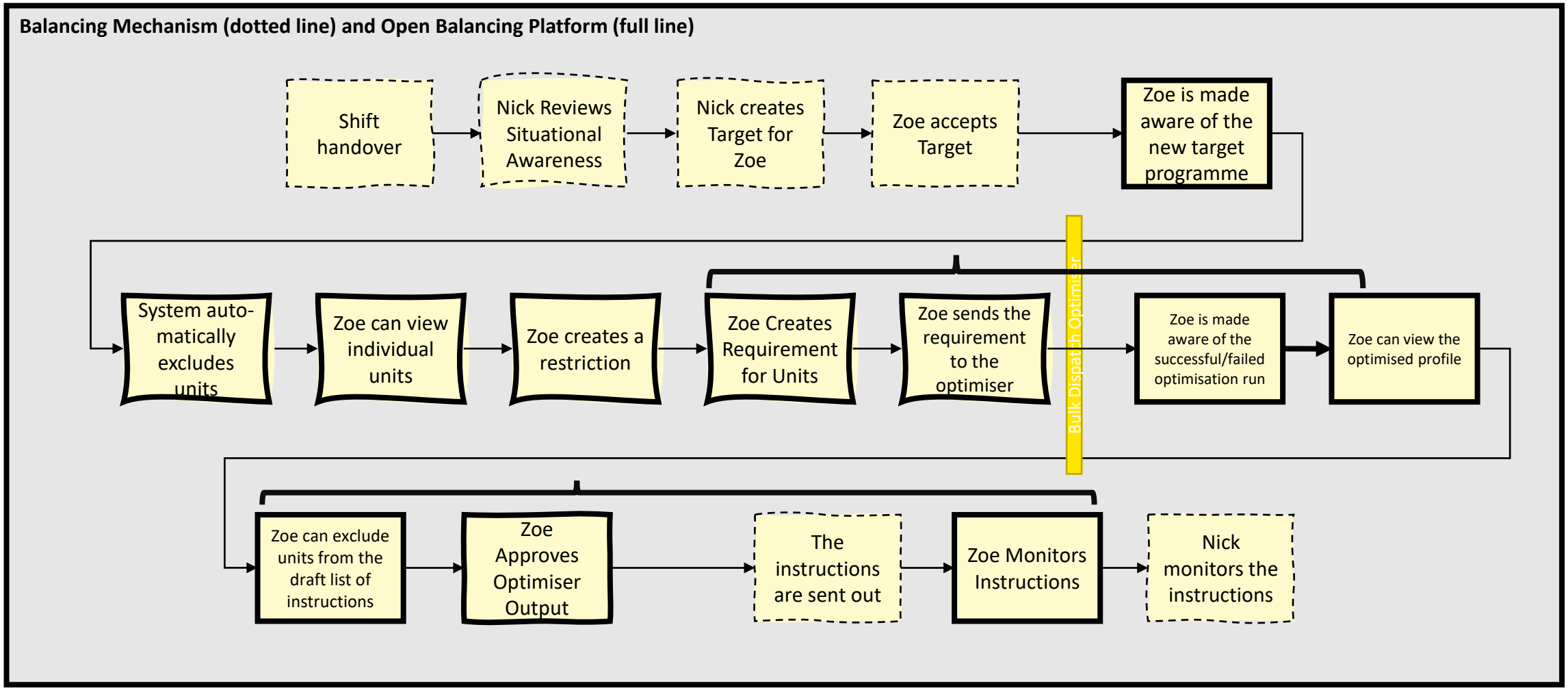
PI8

- Support for multiple control room roles
- Ability to lay out new canvases
- Optimiser tuning
- Support for Non-Functional Requirements

Story of PI7


PI7 Complete Feature Burnup (Committed + Stretch)
Feature/Enabler Count
90
80
70
60
50
40
30
20
10
0
7.1
7.2
7.3
7.4
7.5
7.6
7.7
Sprint
2
13
27
45
55
78
78
3
10
16
31
33
36
70
28
42
52
65
64
64
Baseline Plan
Revised Plan
Actual Features
Total Forecast

Storyboard Schematic (Release 1.0)



Plans for Release 1.1

- Include Wind Units in optimisation
- Initiate Grid Code changes for limited duration assets and include in optimisation
- Support multiple roles and multiple zones
- Introduce new reserve services (Quick & Slow Reserve)
- Provisional release date – March 2023

GOAL

A Zonal Balancing Engineer will be able to bulk dispatch multiple zones and new services

Benefits

Reduction in skip rates , better economic decisions, new services for control, reduced workload in the control room

Subgroups update

Item 9

Subgroups update

- No meetings since last TAC

Next meeting

Item 10

Vernon Everitt

Next meeting and calendar

Meetings are every quarter for a half-day on the first Friday morning of the month, 9am-12.30pm

- 1 Sept 2023

AOB

Item 11

Vernon Everitt