ESO Technology Advisory Council

TAC-8

2 September 2022

Meeting pack

nationalgridESO

TAC-8 agenda – 2 September 2022

Item	Start	Finish	Time	Item	Presenter	Notes
1	9:00	9:05	5	**Welcome & Apologies**	Vernon Everitt	
2	9:05	9:10	5	**Minutes of last meeting and matters arising**	Vernon Everitt	Shubhi Rajnish (ESO CIO) to introduce herself
3	9:10	9:15	5	**Feedback from the last meeting**	Vernon Everitt	Feedback from last meeting
4	09:15	10:00	45	**Balancing Programme – Programme Vision**	Rob Rome Bernie Dolan Gabriel Diaz David Bowman	• Pre read: Balancing Capability Strategic Review Report • Pre read: Balancing Capability Strategic Review Stakeholder Feedback • Programme vision
5	10:00	10:45	45	**Balancing Programme – Open Balancing Platform**	Bernie Dolan Andrew Fletcher Chi-Ho Lam	• Pre-read: OBP PI4 closure report • OBP features • OBP architecture
	10:45	11:00	15	**BREAK**		
7	11:00	11:45	45	**Network Control programme**	Ian Dytham Adam Tyler Keith Eller Richard Winterburn	Control room operator console vision
8	11:45	11:50	5	**Subgroups update**	Vernon Everitt	
9	11:50	11:55	5	**Next meeting and calendar**	Vernon Everitt	Next meeting: Friday 2 December
10	11:55	12:00	5	**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-7 are out for comment via circulation and will be published once agreed.
- The feedback from the meeting will also be published.
- This section will be used to discuss any matters arising.

Feedback from the last meeting

Item 3

David Bowman

Feedback from the last meeting

- The topics discussed at the last meeting were:
  - Balancing Programme
  - Network Control Programme
  - RIIO-2 BP2

- Feedback from the TAC was around:

  - Balancing Roadmap
  - Benefits
  - Costs, risks and assumptions
  - Planned engagement
  - How to move from traditional waterfall to agile with long standing supplier
  - How to recruit new talent

- The feedback on these topics have been noted by the respective programmes. Some of the material presented today will help cover the points raised.

Aims of today

- In today's meeting, we will discuss:
  - Balancing Programme Vision
  - Open Balancing Platform
  - Future ENCC Operator console

- We assume the pre-read material is read, and will not go through it all in detail

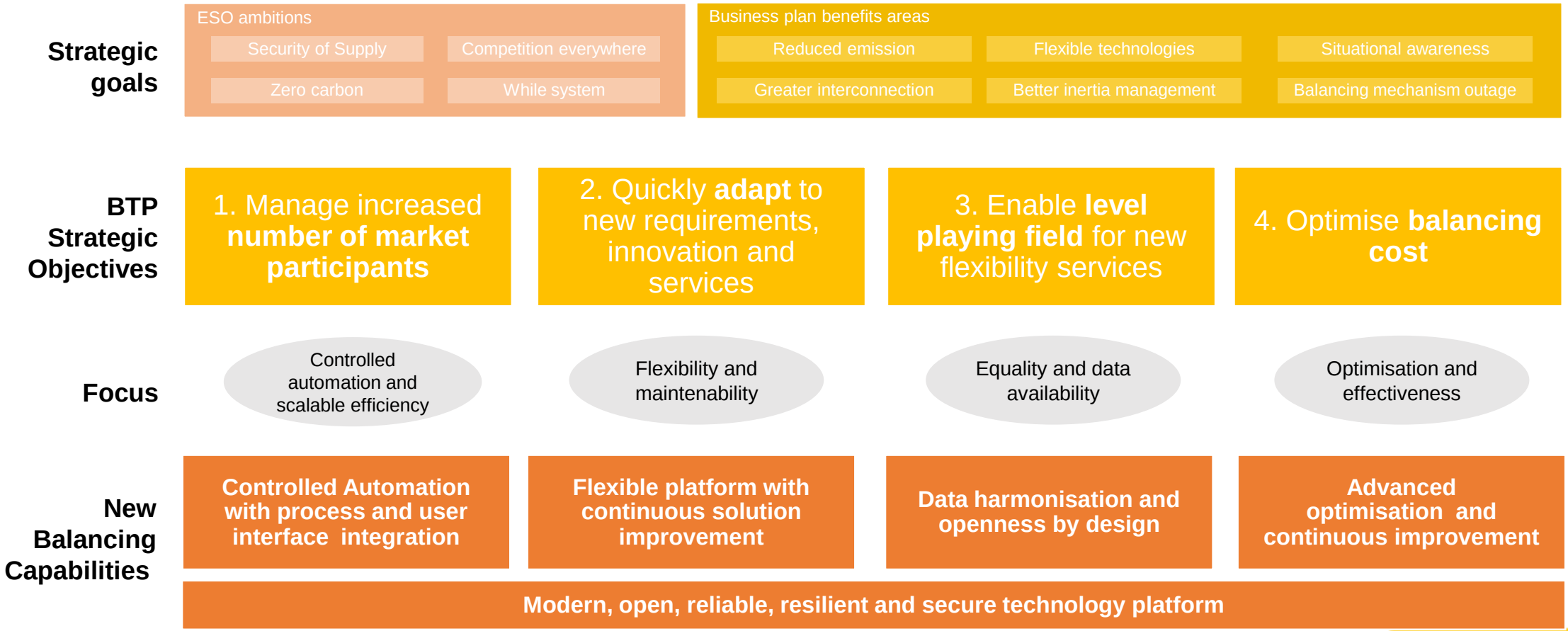
- Instead, we have a number of discussion questions for each section that we invite an **open discussion** on. The questions should be viewed as themes.

- Overall – we want to hear about your experiences with similar challenges and considerations that we are facing

Balancing Programme – Programme Vision

Balancing Transformation – Change Vision

The programme strategic objectives and the new enabling business capabilities were set to address the scalability challenges and modernise the core platforms to provide increased reliability and flexibility in line with RIIO2 business plan



Product Vision

Net zero ready network	• System Security Modelling • Service Flexibility
Growing Market	• Greater automation + optimisers • Targeted situational awareness
Transparent decision-making	• Consistent tool-driven decisions • Full auditability
Flexible IT	• Modern technology • Easy to support

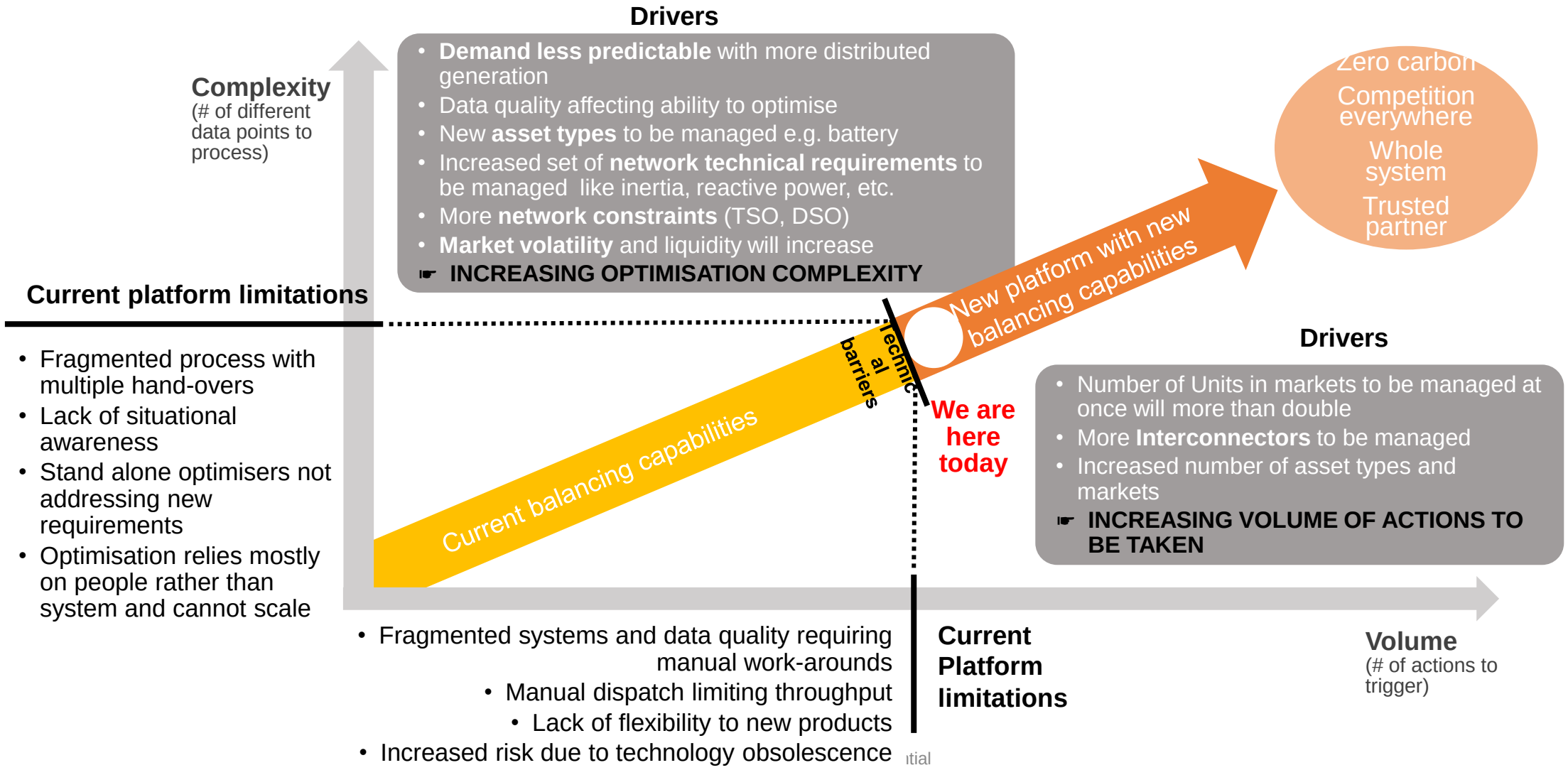
Discussion questions

- How do we measure the success of our vision?

- How does our vision sit with wider considerations, for example the cost-of-living crisis?

Current challenges and change drivers of the balancing platform

The current balancing platform is not able to scale and address the increased volume and complexity of balancing activities therefore a new balancing platform is needed to deliver the new required capabilities.

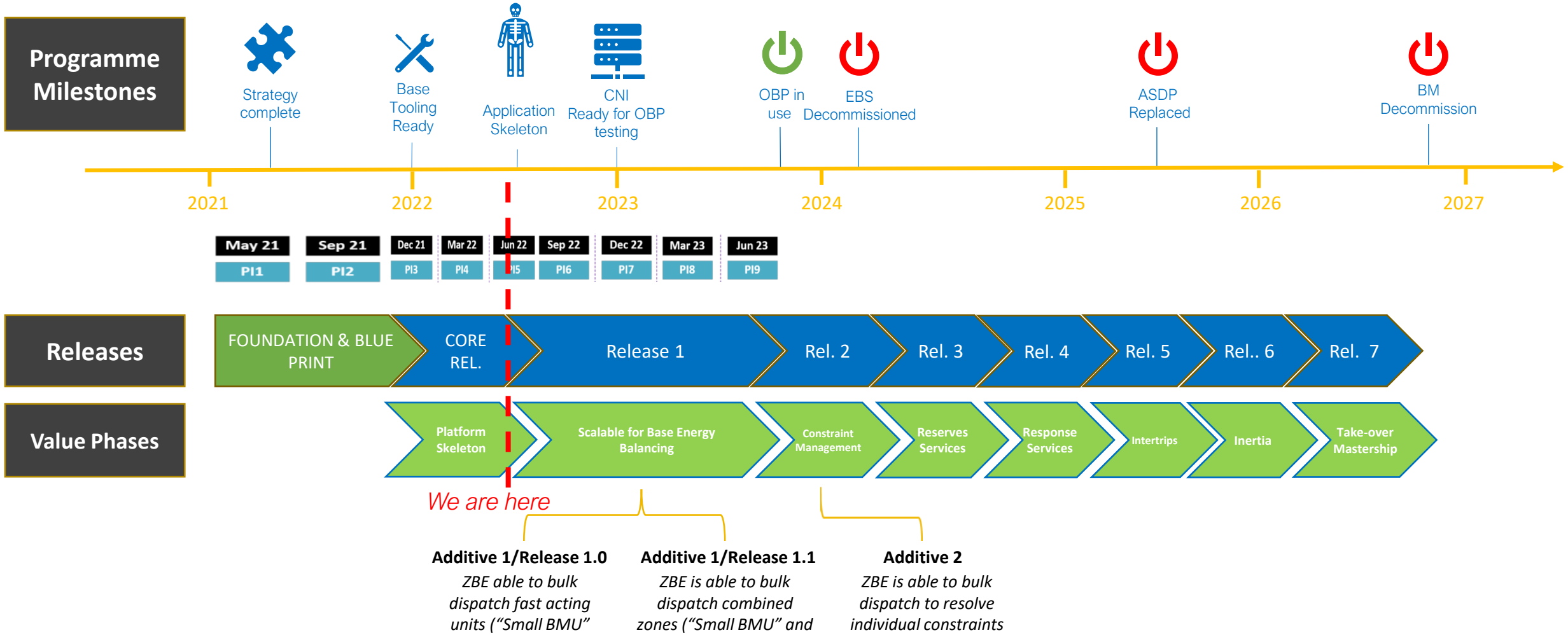


Discussion questions

- How do we keep the drivers of change relevant?

- We will continually build on work done in our strategic review of balancing capability with regular engagement and updates. What else should we consider doing to ensure the strategy continues to meet requirements?

Programme Overview



Additive 1/Release 1.0

ZBE able to bulk dispatch fast acting units ("Small BMU" zone) without breaking constraints

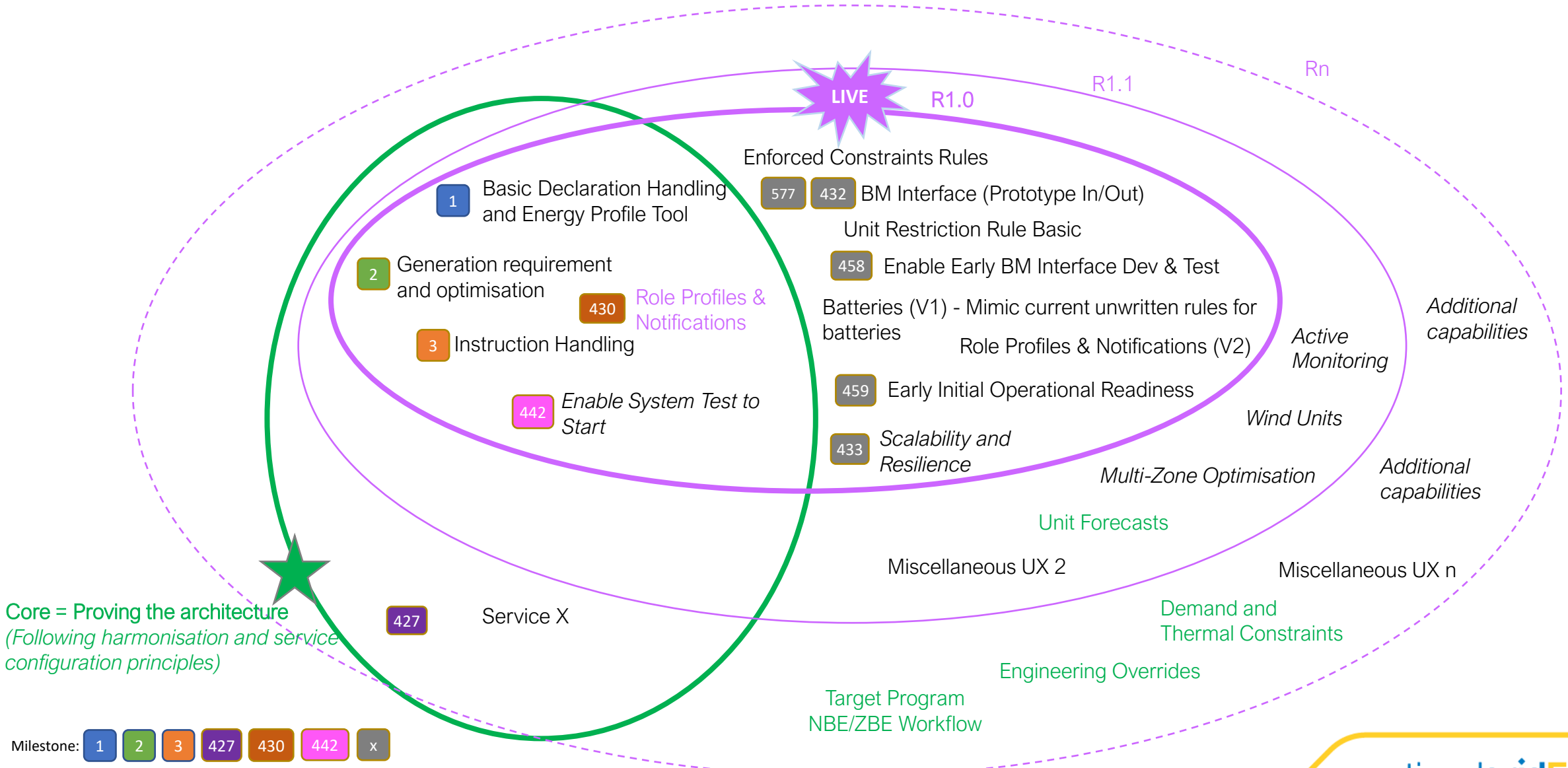
Additive 1/Release 1.1

ZBE is able to bulk dispatch combined zones ("Small BMU" and Wind) without breaking constraints and with integrated CCL monitoring

Additive 2

ZBE is able to bulk dispatch to resolve individual constraints

PI5: Complete Core & Runway to Release 1



Balancing Programme – Open Balancing Platform

OBP Product Features

- **Controlled Automation with Processes and User Integration**
  - Bulk Dispatch capability removes the heavy reliance on manual processing and inspection that the control room currently do. Optimisation operates on a macro level allowing the user to specify a requirement profile, and the system will determine an optimised unit/instruction set and provide the Control Room a final approval before bulk dispatch. Future phases will offer pre-dispatch logic and “course correction” closer to real time
  - Constraints Management would offer ability to optimise and bulk dispatch according to constraints limits. Similarly, OBP will seek to automate and provide system process logic across longer timeframes, such as scheduling, and unit commitments
  - A modern UI will better support Control Room situational awareness allowing for the Control Room engineers to
- **Flexible platform with Continuous Solution Improvement**
  - OBP is developed using modern technology and methodologies. With DevOps methodology and also an underlying flexible business and solution architecture, Balancing Transformation can deploy changes quickly and securely
- **Data Harmonisation and Openness by Design**
  - Data Harmonisation underpins the Unified Service Model which allows OBP to handle the assets available to the ESO in a standardised and harmonised manner. This provides a “fairer” level playing field model by which the system can offer an optimised solution based on the capability of assets rather than what category (such as a given zone, or unit profile) assets have been allocated
- **Advanced Optimisation and Continuous Improvement**
  - OBP utilises modern optimisation technology (Gurobi). Further, the architecture allows for multiple implementations of the optimiser, targeted to specific “problems” that the Control Room need to solve. If necessary, a different optimiser can be integrated to target another problem, or target a different optimisation model. The model will support feedback loops to support continuous improvement

Key concepts

Key Design Principle : High-availability to support CNI operations

Key Design Principle : Automated recovery (from micro-services to platforms) to minimise Operator workload

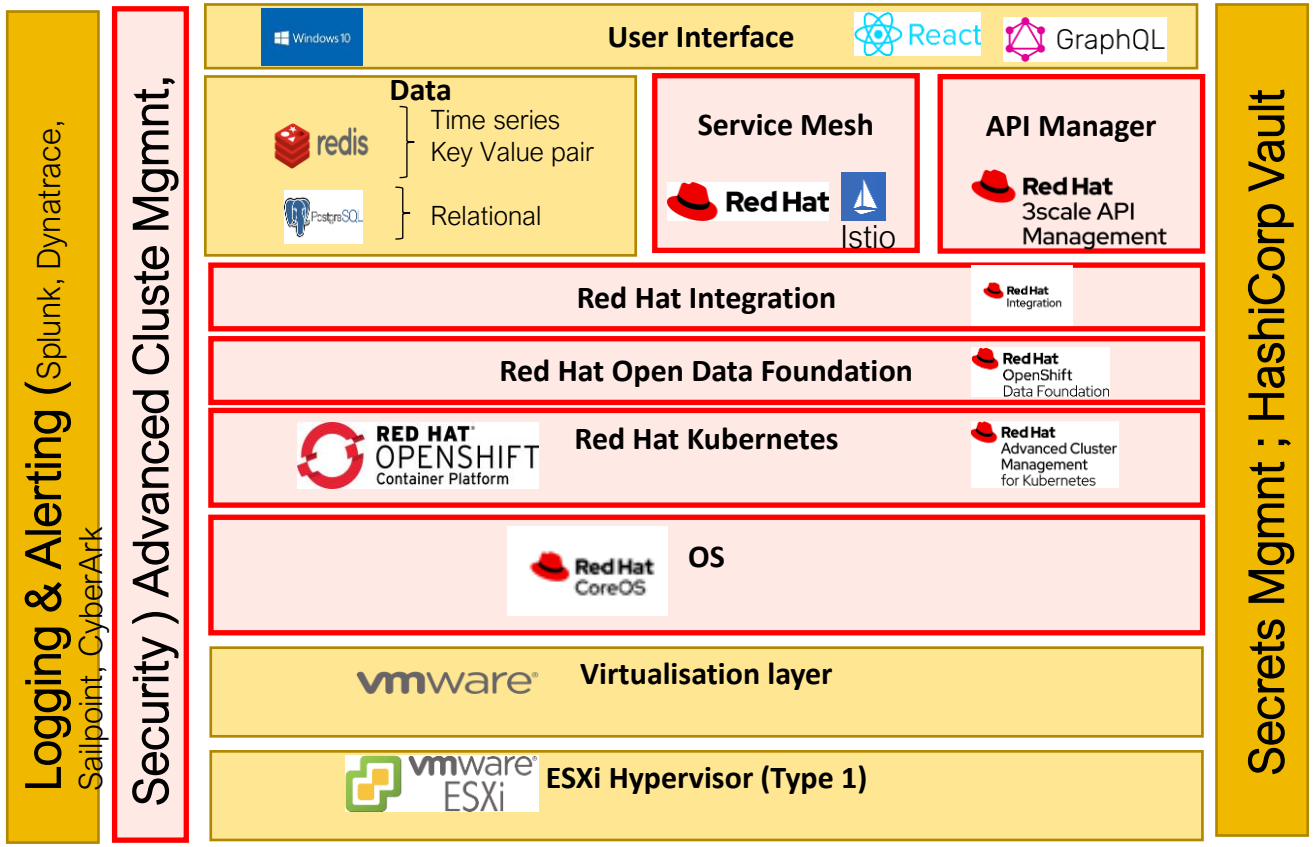
Modular target architecture for multiple Solver solutions and timelines

Incremental development using Scaled Agile with Engineering – *Workproducts, Roadmap and Status*

Scalable Hybrid OpenShift platform deployable across Azure (Dev & test) and CNI (prod)

Maintainable system supported by DevSecOps and GitOps

OBP – Technology Stack



Dell Hardware

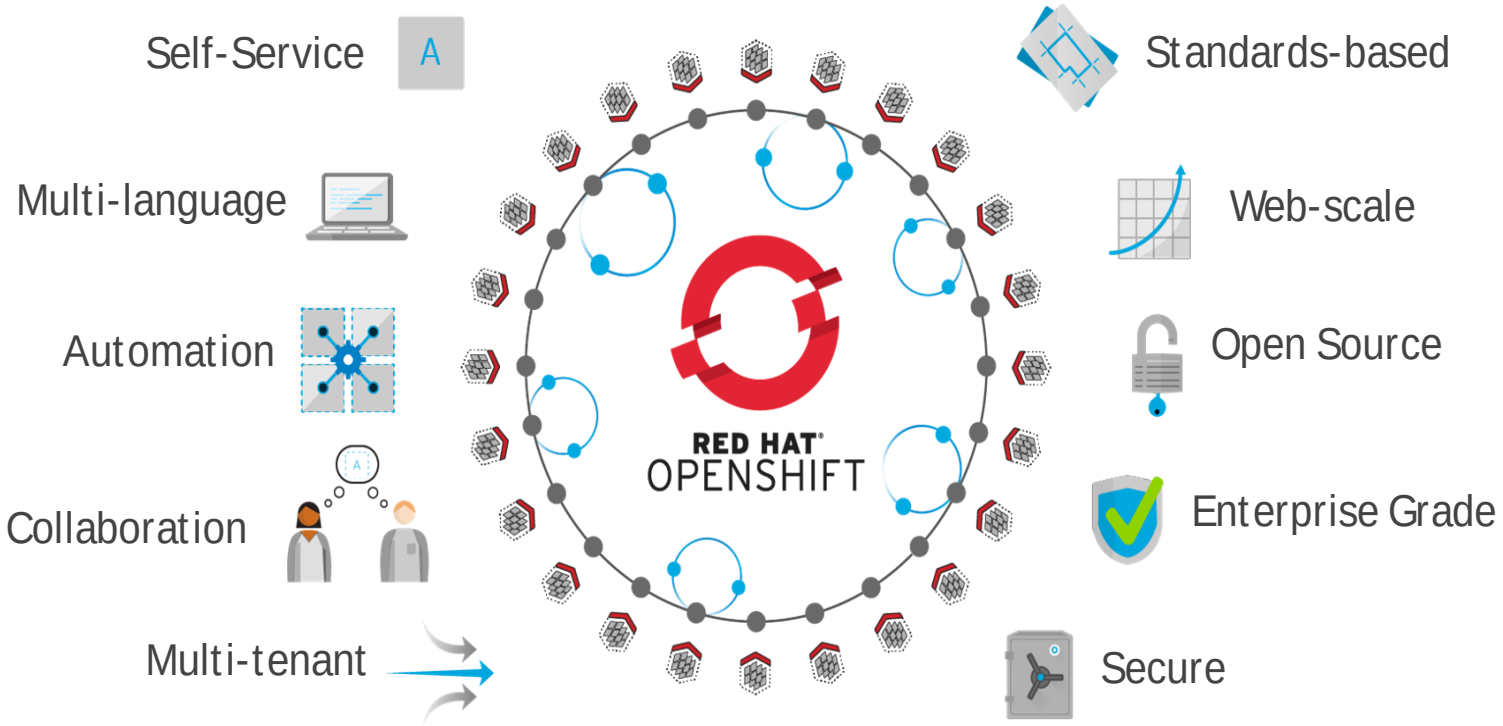
'Design to Operate' : Where possible and appropriate, a single vendor has been used as this simplifies the support channels, commercials

'Leverage existing knowledge' : Use NG / ESO standard platforms where possible. Dell, VMWare, RHOS, React, Redis, DELL

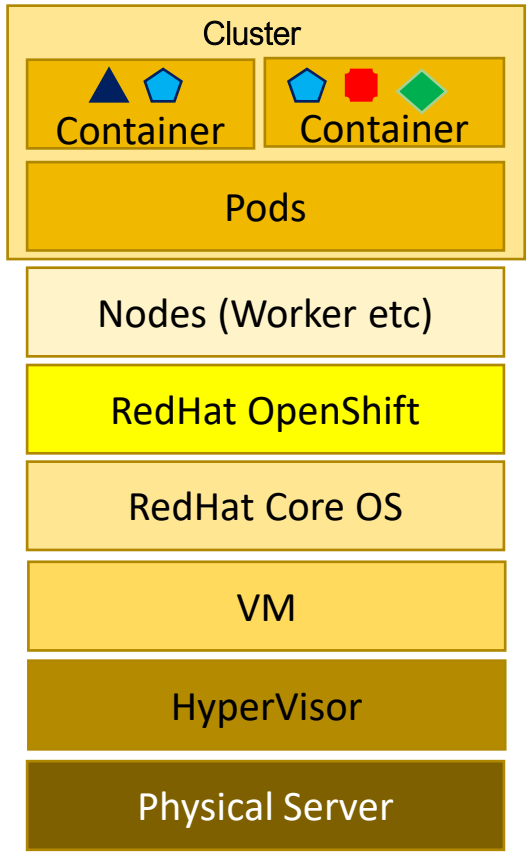
What is Red Hat OpenShift and what are the components ?

Red Hat OpenShift is an open Source Kubernetes platform that provides users with a scalable, reliable means of running Containers

Containers are sealed (immutable) packages containing code. Their contents cannot be changed (but the Containers themselves can be replaced (updated)



Red Hat OpenShift : Core Components



Code e.g. Micro-service contained within the container. Multiple or single objects depending on the service

An immutable 'package' that contains just the binaries and libraries required to run the code within; In OBP-terms, these run the Micro-services

The smallest unit of computing hardware in Kubernetes. Represents a single machine in a cluster. Can be auto-replicated for scalability / load balancing

Nodes can be 'pooled together' for form Clusters

The Kubernetes 'OS'. Provides the K8 environment, tools (monitoring, auto-recovery, logging / alerting, security); also access to storage via RH Open Data Foundation, Service Mesh etc

K8 Operating System : A cut down, hardened version of RHEL, designed specifically for RHOS

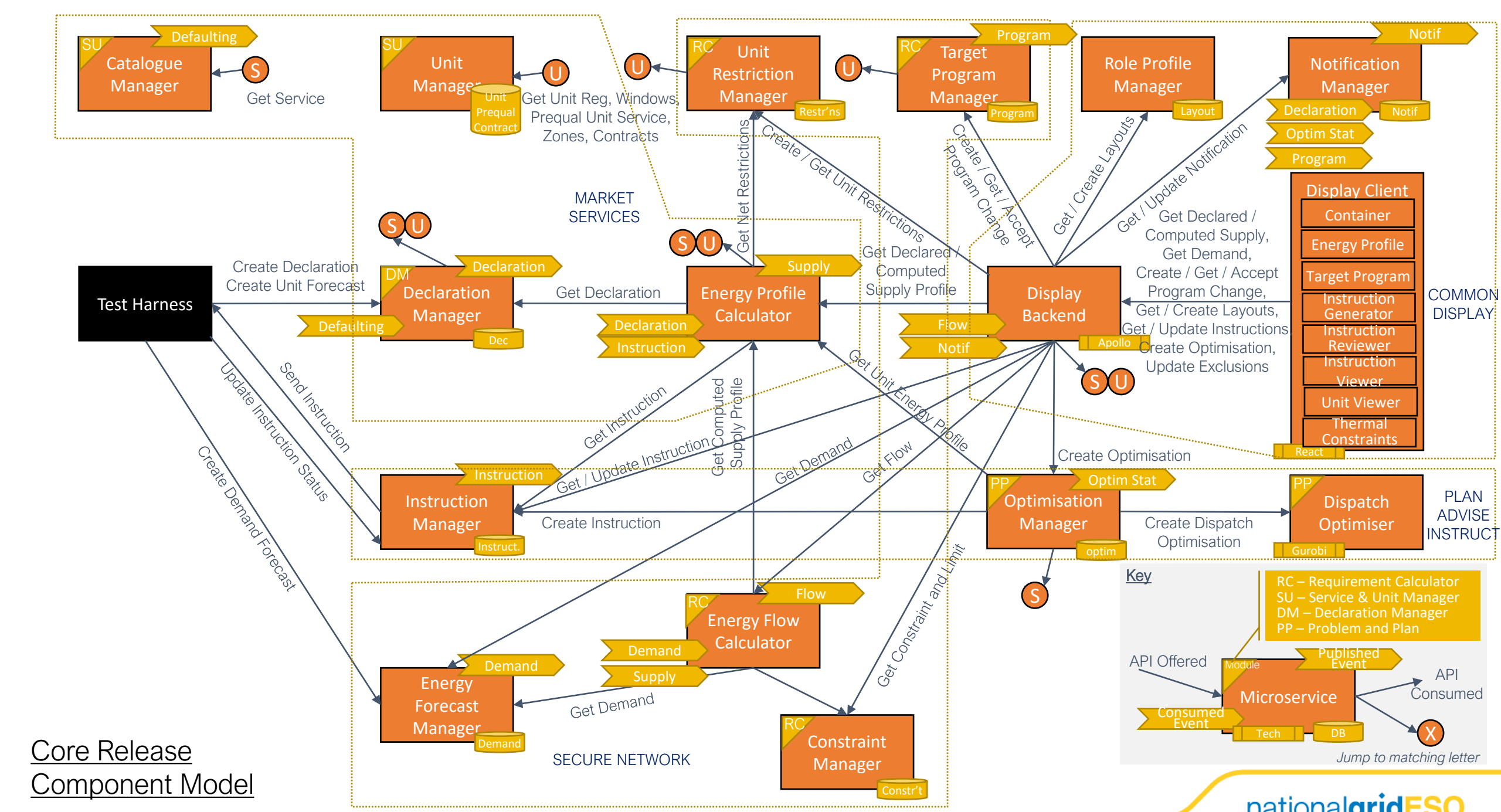
Virtual Machine : Runs the host OS (RHCOS for OBP)

Type 1 HyperVisor (ESXi) : Provides a platform for the VMs

Physical compute / RAM

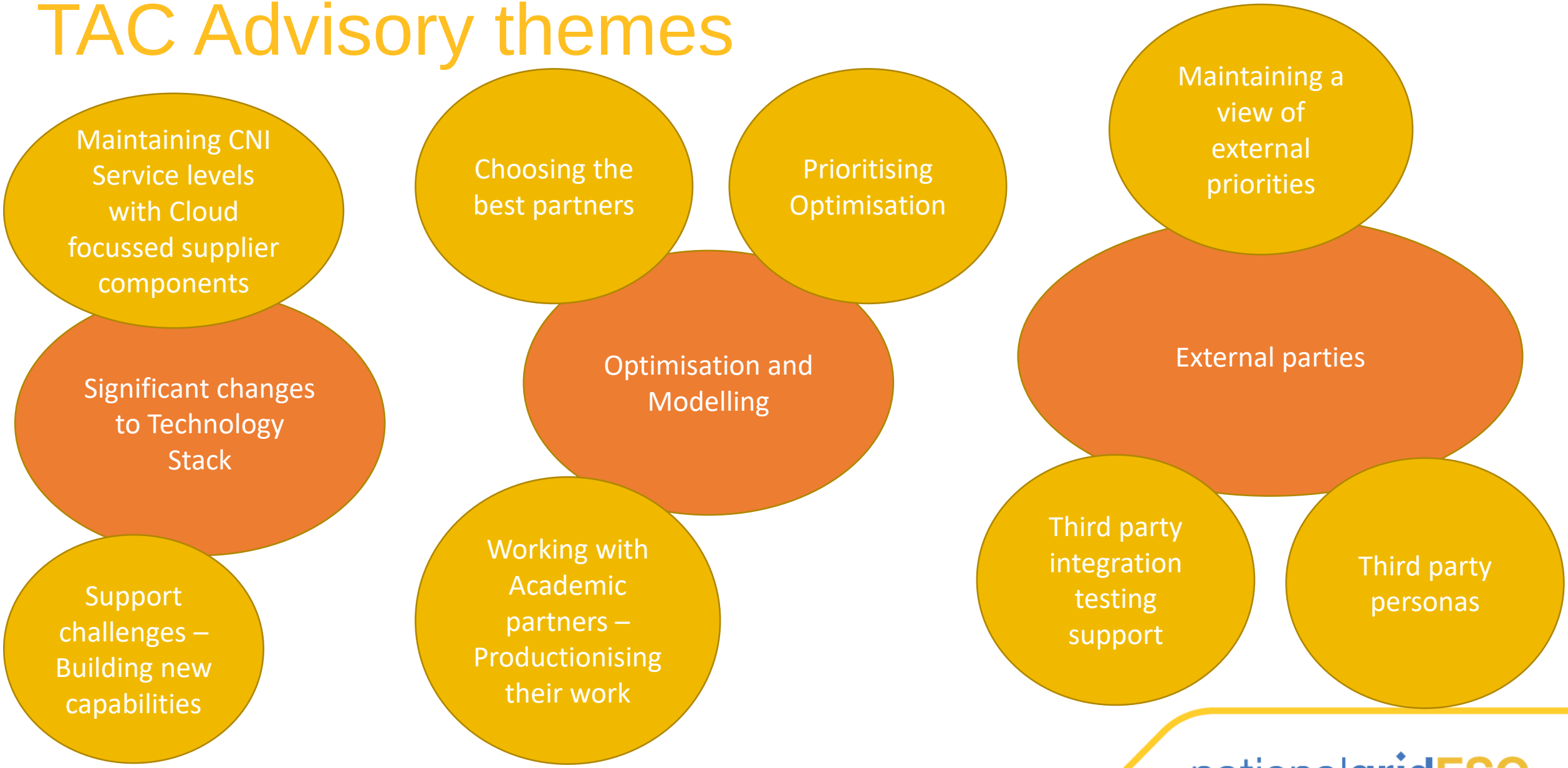
Clusters, Nodes, Pods and Containers can all be distributed across multiple om-prem datacentres or across on-prem and cloud (a hybrid model) to provide fault tolerance and scalability.

Failures of physical servers, VMs or OS's are handled by the HyperVisor; failures of RHOS, Nodes, Pods, Containers or even indivudla Services are handled by RHOS



Core Release Component Model

TAC Advisory themes



Discussion questions

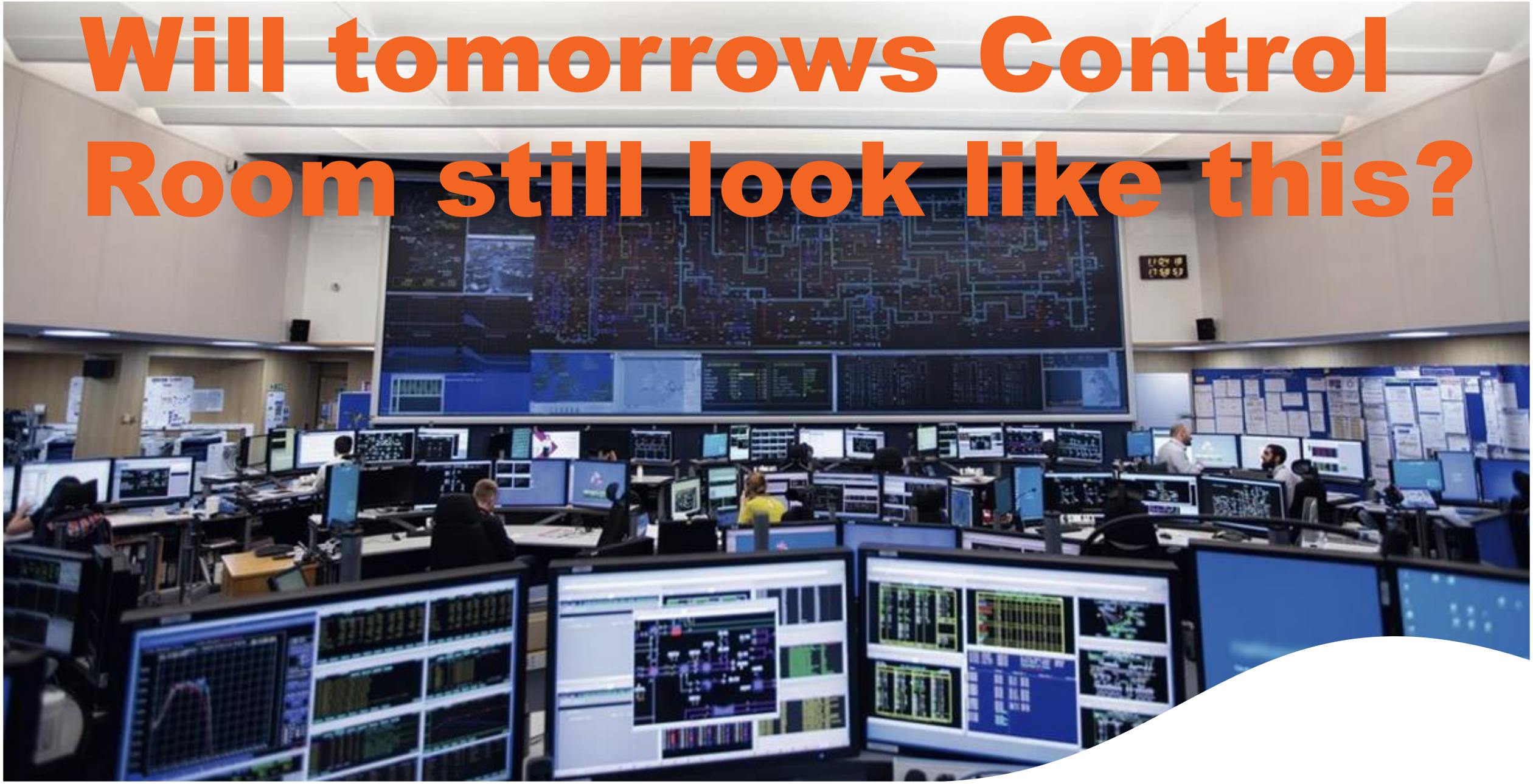
- Theme: Significant changes to Technology Stack
  - The use of RH OpenShift containers represents an entirely new technology stack to the ESO. Can the TAC members provide any insight and advice on transitioning to a completely new technology stack within a CNI “like” environment?
  - We began design of the operational services very shortly after completing the Blueprint phase – does the TAC have any advice and guidance on supporting an entirely new technology stack?
  - CNI service levels require ESO to provide an 8 hour resolution time for priority 1 incidents. Our Component suppliers no longer offer this sort of service level, we’re overcoming this by the use of containers; Have any of the other TAC members found a novel approach to the issue of vendor service levels?

Discussion questions

- Theme: External Parties
  - With the deployment of the new Open Balancing platform, what are the biggest concerns the TAC have about the impact on their organisation? E.g. changes to interfaces? Increased transaction numbers? Integration testing?
  - Would any of the TAC members be amenable to support the latter stages of Integration testing for units instruction?
  - Would any of the TAC members want to be involved in the refinement of features involving External suppliers and data consumers?
- Theme: Optimisation and Modelling
  - Do any of the TAC members have any advice on the productionising modelling outputs from Academic partners?

Network Control Programme

Will tomorrows Control Room still look like this?



Technical Advisory Council

2nd September 2022

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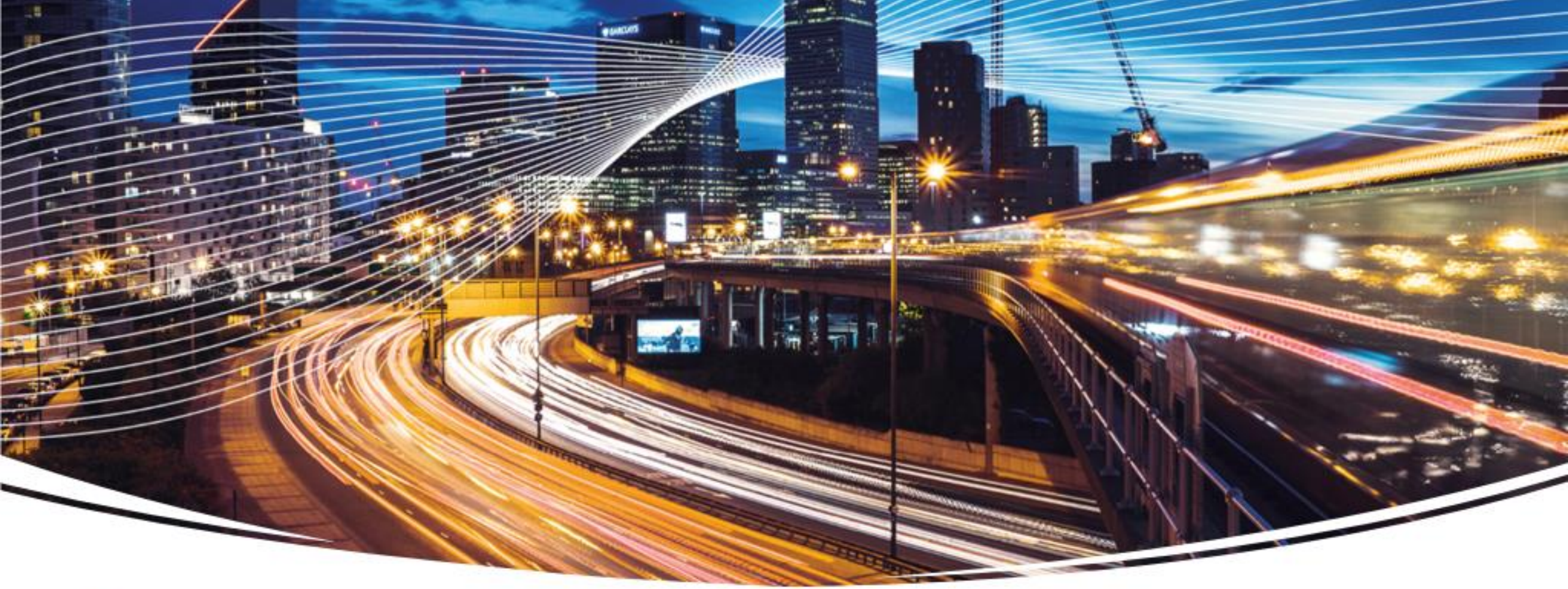

Our mission

is to enable the transformation to a sustainable energy system and ensure the delivery of reliable, affordable energy for all consumers.

Success in 2025 looks like:

- An electricity system that can operate carbon free
- A whole system strategy that supports net zero by 2050
- Competition everywhere
- The ESO is a trusted partner

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The vision for a new Control Room User Experience

- We need to meet the transformational challenge ahead of us by providing Control Engineers with the ability to monitor and understand the “active” status of the network, including the proximity to the secure operating envelope, and changes to the evolving operational limits.

- This is an opportunity to integrate our new tools, applications and processes, and to enable us to share and work from a common data source within a single user platform.

- The Operator Console project aims to provide the Future System Operator with a user interface providing good situational awareness and an improved user experience via:

  - developing a videowall (or similar) format to provide an “active” system overview
  - creating the capacity for role specific configurable work spaces
  - integrating communication interfaces for external data sharing and telephony

Operator Console

- The Operator Console should:

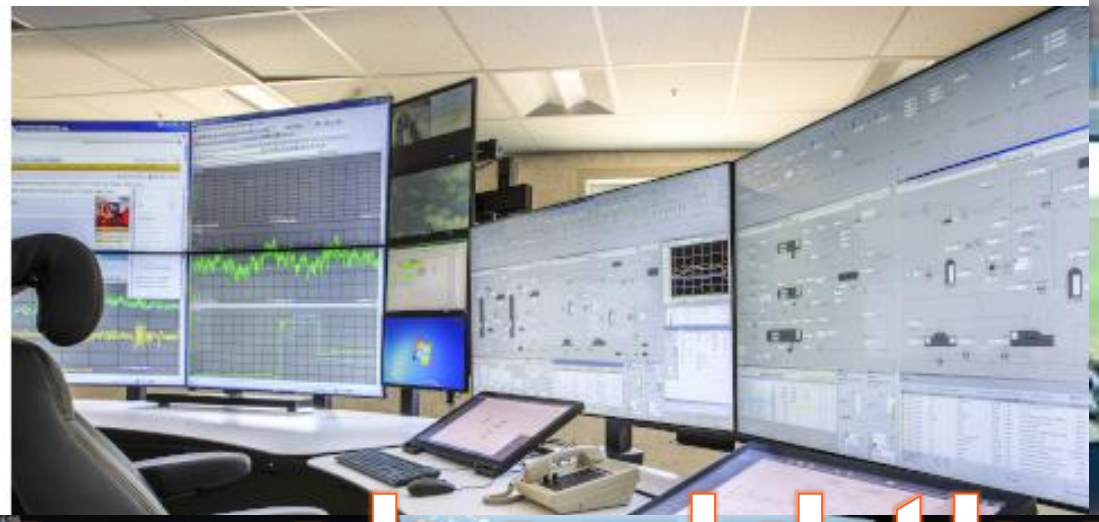
  - Enable a better understanding of the electricity systems operating envelope, to:
    - Improve the Management of security risks
    - Ensure that balancing actions are implemented more efficiently
    - Operate the system at lower cost to the consumer

- The Operator Console needs to provide “active” situational awareness of the system condition, including plant status and real time alarm conditions. Could Artificial Intelligence and Machine Learning be utilised to guide mitigation and remedial operator responses?

- Power System simulation is required in “look ahead” time phases. This will create the ability to predict future transmission problems in a more volatile operating environment.

What are some of the Challenges?

- Is there a better way to present situational awareness to the Future System Operator ?
  - What should an “active” system overview contain to be most meaningful and de-cluttered?
  - What might a dashboard look like to highlight the current proximity to a secure operating envelope, and is there scope to view constraint awareness in the near future, including the options required to manage these situations?
  - Will a reduction in the number of Alarms being presented to the operator, increase or decrease overall situational awareness?
  - How should alarms be presented and how can priority alarms be made to stand out?
  - How can we utilise effective dashboard techniques to demonstrate RAG status?



How should the Future look?

Subgroups update

Item 8

David Bowman

Subgroups update

- No meetings since last TAC-7

Next meeting and calendar

Item 9

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

- 2 December 2022
- 3 March 2023

AOB

Item 10

Vernon Everitt

Links to relevant materials

- Balancing Capability Strategic Review report
  https://www.nationalgrideso.com/document/263586/download

- Balancing Capability Strategic Review Stakeholder feedback report
  https://www.nationalgrideso.com/document/265456/download

- Balancing Transformation Programme Increment 4 closure report
  https://www.nationalgrideso.com/document/265341/download