Brae allocation system migration

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Dr David Stewart
Hydrocarbon Allocation & Production Manager

Angus Davidson
Senior Hydrocarbon Accountant

TAQA Bratani Ltd

POWERING A THRIVING FUTURE

Brae Allocation System Migration

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❑ Background to Brae assets.

❑ Previous allocation system and rationale for migration to EnergySys.

❑ Project planning – objectives, key challenges, approach.

❑ Project implementation.

❑ Testing and evaluation.

❑ Post-migration experience and on-going developments.
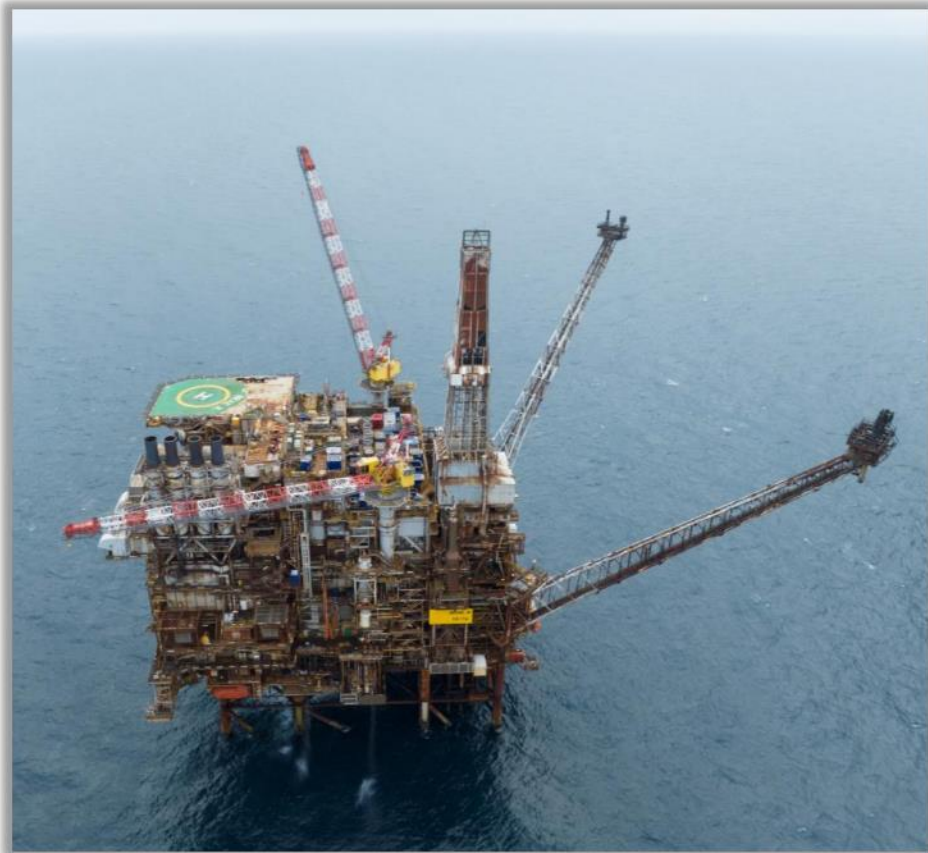
❑ Lessons learned.

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Brae Alpha

East Brae

Brae Allocation System Migration

- Background to Brae assets

❑ Brae assets comprise the Brae Alpha and East Brae platforms and multiple fields:

| Brae Alpha	East Brae
South/Central Brae (TAQA + 2 partners) West Brae (TAQA + 2 partners) Enoch (100% 3rd party) Trees (100% 3rd party)	East Brae (TAQA + 2 partners) Braemar (TAQA + 2 partners) Devenick (TAQA + 2 partners)
Plus 3rd party FPS pipeline entrants – Heimdal, Andrew, T-Block	

❑ Complex infrastructure involving both platforms, multiple fields, two onshore terminals (one liquids & one gas) and pipelines.

❑ Brae Bravo COP 2018 – offshore decommissioning complete.

❑ Described by Tieto (EC) as "the most complex allocation process we have seen in the North Sea".

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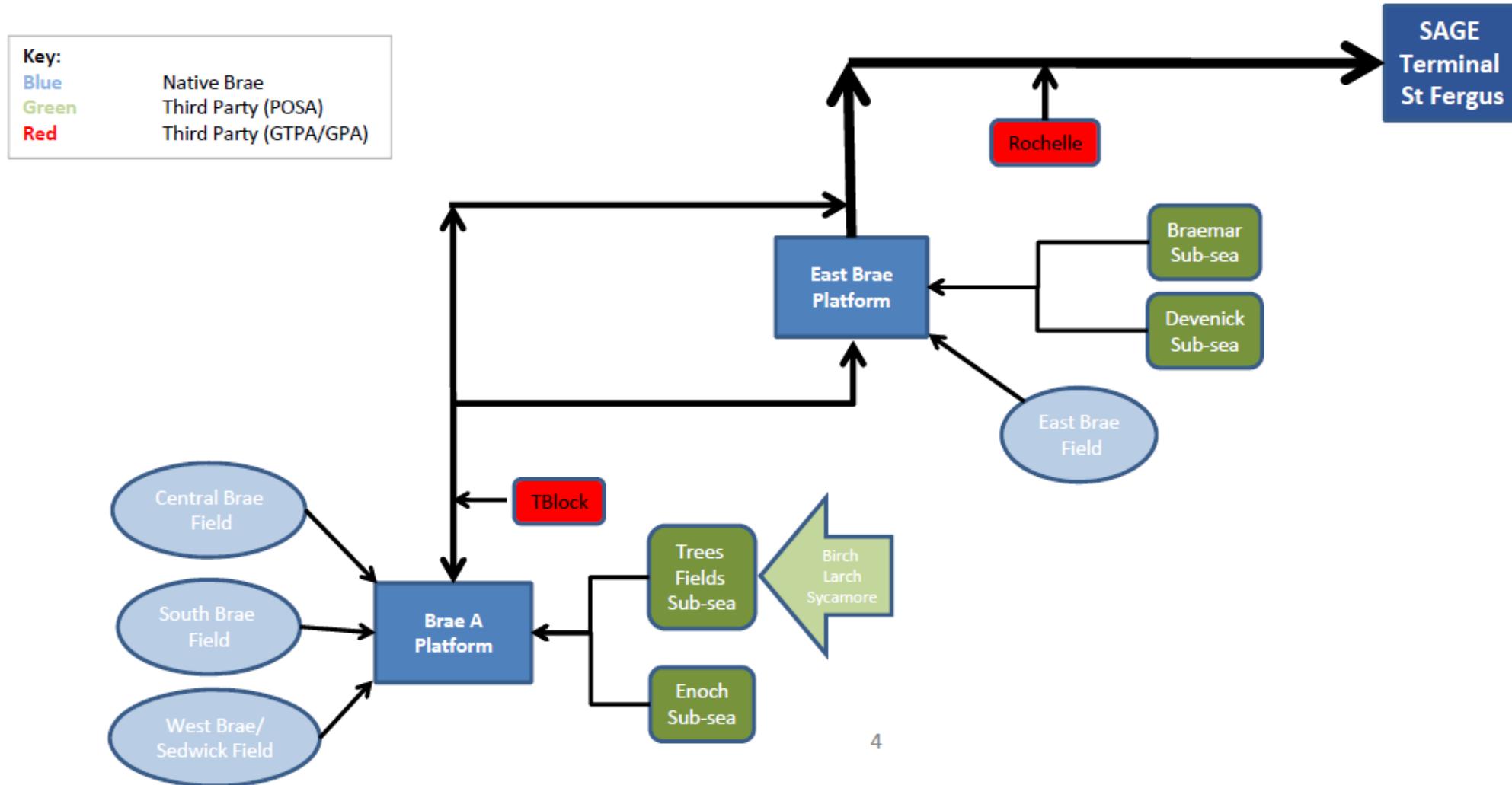
- Background to Brae assets – export liquids
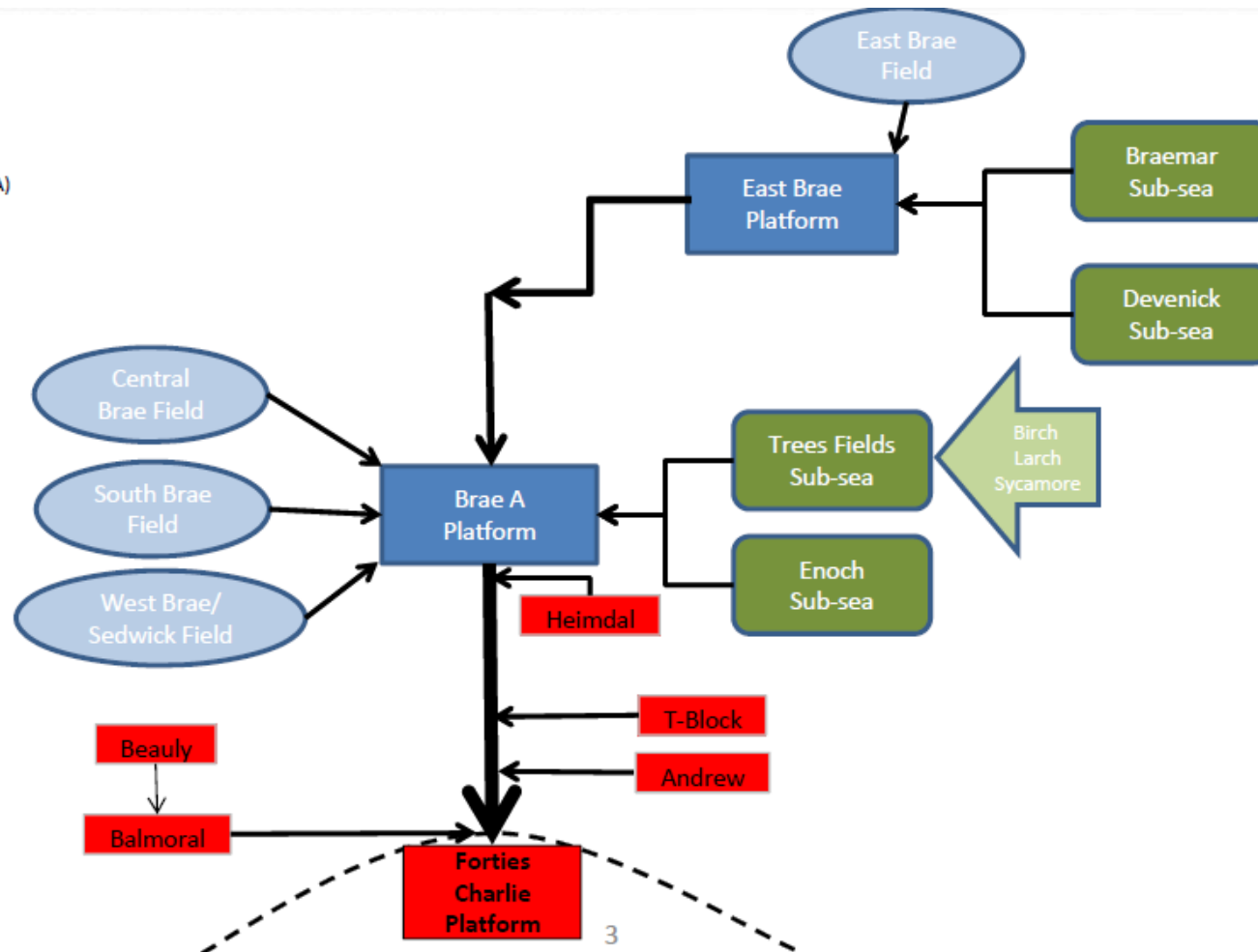
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- Background to Brae assets – export gas

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Brae Allocation System Migration

- Previous allocation system and rationale for migration to EnergySys

❑ Previous allocation systems:

- Legacy in-house Production Reporting System (1983–2012). SQL Server database.
- Energy Components (2012 – 2023, upgraded in 2019). Oracle. System being replaced in this project.
- Data held separately for both systems.

❑ Why change? (technical and business reasons):

- Difficult and/or expensive to implement changes in EC.
- Lack of transparency of system configuration.
- Opportunity to deliver reports from one source. (EC reports/Business Objects/adhoc Excel queries).
- Automate manual workarounds and eliminate manual data-entry.
- Integrate all assets into a single system.
- TAQA experience of system design/build & support from EnergySys.

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- Previous allocation system and rationale for migration to EnergySys

❑ Why change? (people reasons):

    ○ TAQA now in "ultra-late life" mode.

    ○ All TAQA assets (including Brae) will COP in the next few years.

    ○ [Staff engagement and skills development.](#)

    ○ *How many allocation teams get to design and build their own allocation system?*
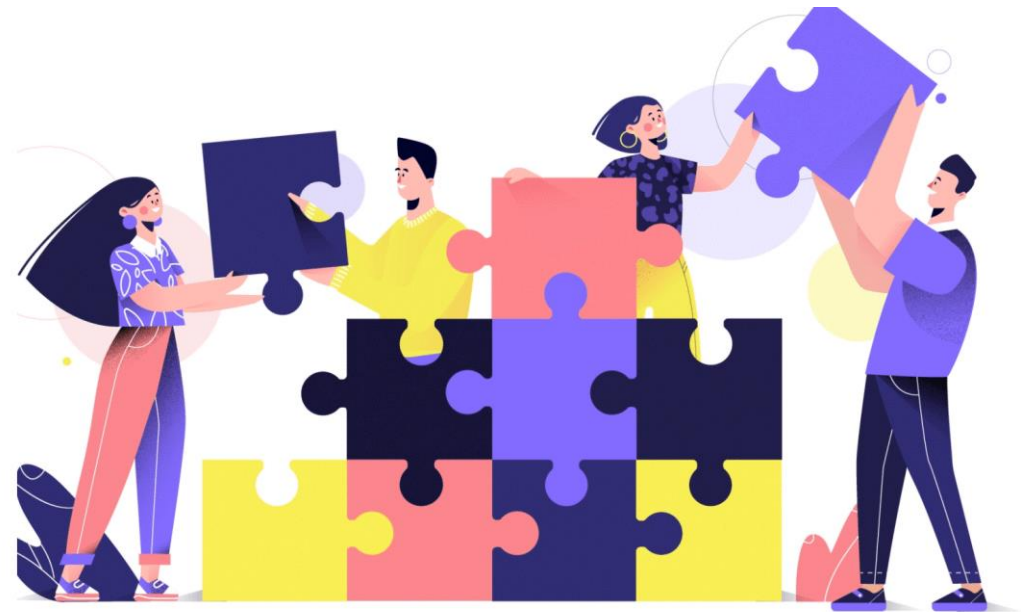
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Brae Allocation System Migration

- Project planning – resourcing

| Approach	Pros	Cons
Outsourced	• TAQA team workload • Access to specialist system development skills	• Reduced control • Cost (direct) • Key knowledge lost / not captured
Managed in-house, bring in external resource to assist	• TAQA team workload • External ideas	• As above but less significant. • Overlap of effort/responsibility
Completely in-house	• Full control and flexibility to adapt throughout project • Staff development • Greater interaction with business needs • Optimise TAQA team knowledge and experience	• Workload, workload, workload… • Lose out on external ideas?

Brae Allocation System Migration

- Project planning – objectives

☐ Should look to the outside world that nothing has changed (initially at least).

☐ Replicate existing system – same inputs should give **<u>exactly</u>** the same outputs.

  - Reuse EC Excel Calculation templates within EnergySys, change I/O around the calculations.

☐ Integrate "out of system" steps (with EC) into EnergySys.

☐ Consolidate all reporting into EnergySys.

☐ Consider future improvements and design for them upfront.

Spot The Difference Game

There are eight differences in the images below. Can you spot them all and win the game?
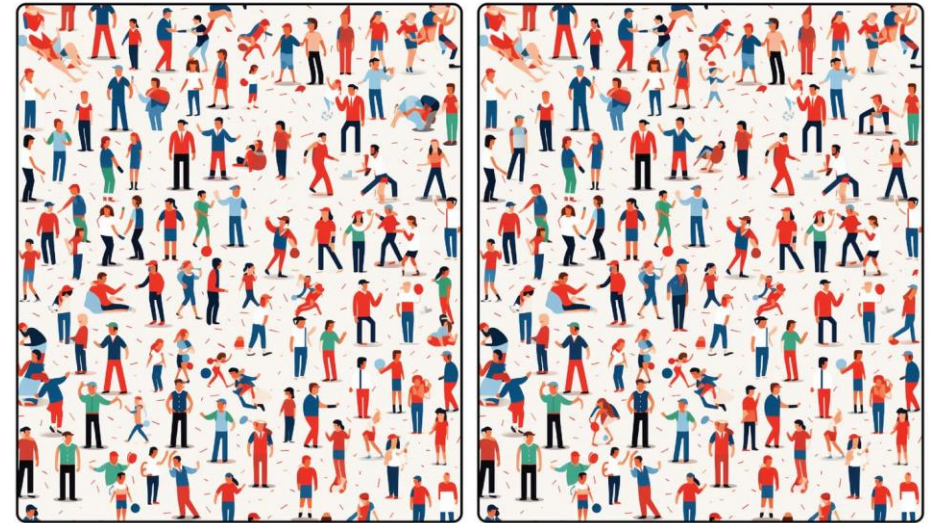
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Target difficulty = Very High!

Brae Allocation System Migration

- Project planning – key challenges

❑ Brae reporting aligns with two separate production days:

- o SAGE gas pipeline   - 06:00 to 06:00.
- o Forties Pipeline System   - 18:00 to 18:00.

❑ EC system ran allocations on a 12-hourly period and aggregated relevant totals for 06:00 and 18:00 reporting:

- o Stick with this approach or move to 24 hr allocations for each period?
- o HYSYS models run for 7-days period on an 18:00 to 18:00 basis (for FPS).
- o Moving to 24 hr allocations means each week one 06:00 to 06:00 period uses two HYSYS models...

❑ Input measurement data source:

- o EC takes data direct from PHD (Honeywell system).
- o Existing TAQA system takes data from PI via a custom "eLogbook" application.
- o Change to 24 hr allocations would require 100s of new PI tags for 06-06 and 18-18 periods.

Brae Allocation System Migration

- Project planning – approach

❑ Some internal resistance to 12 hr allocations, plus requests for 00:00 to 00:00 reporting!

❑ Overall, it was considered that retaining the 12 hourly allocations was the best option:

- o Minimises new tag creation in PI.
- o Retains existing data flow and calculation process logic.
- o Avoids confusion within HCA team compared to existing logic.
- o Has worked well since introduced as part of EC implementation in 2012.

❑ Business request for 00:00 to 00:00 reporting to align with other assets rejected as it adds very little but creates huge workload to develop.

- o 06:00 – 06:00 reporting used as a proxy for 00:00 – 00:00 for internal reporting.
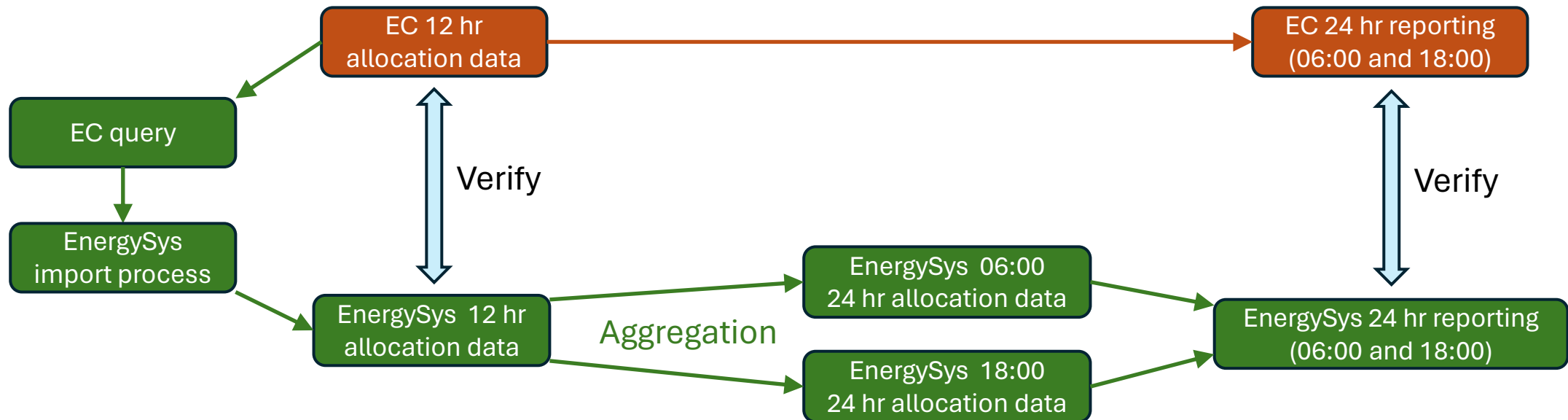
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❑ Lessons learned.

Brae Allocation System Migration

- Project implementation – Business Priorities

❑ Requirement for internal reporting alignment ASAP, <u>not at end of project</u>.

❑ Commenced work on allocation output objects first (i.e. start at the end and work backwards!)

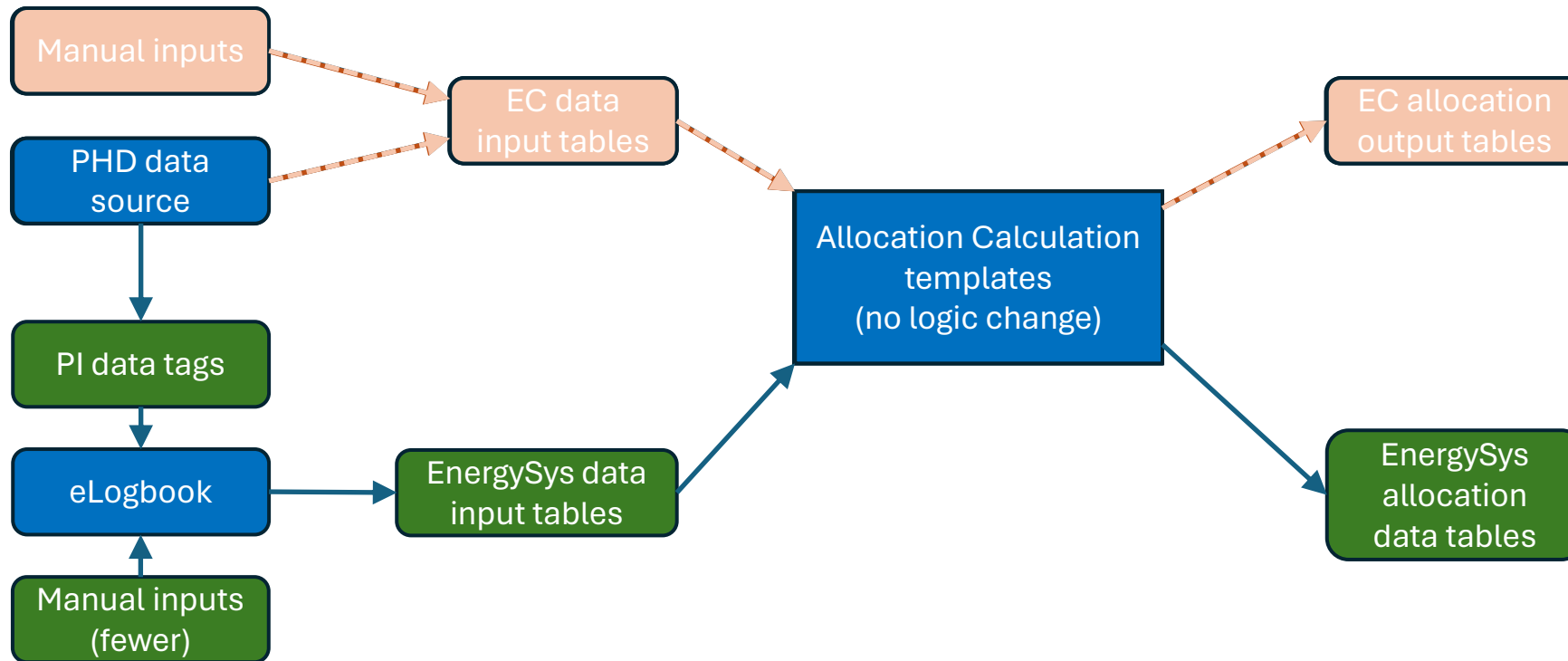❑ Implemented in Production (Live) system very early in the project.

Brae Allocation System Migration

- Project implementation - configuration

❑ Measurement data sources.

    o All PHD tags routed through PI and into eLogbook, so one source of data into EnergySys.

Brae Allocation System Migration

- Project implementation - configuration

❑ Configuration of all EnergySys data objects.

- o 121 measurement points (oil, water, gas, equipment)
- o 73 wells (hours online)
- o 555 individual measurement inputs

❑ Measurement data sources.

- o 1st stage auto-validation – missing data, min/max values, frozen data checks (12/24 hr).
- o Gas composition data – mol % to mass % conversion
- o Automate where possible:
  - Well hours. Offshore enter 24 hr values, so make use of the data (auto-split into 12 hr values).
  - Well tests.
  - Lab sample reports – auto load and validated vs limits and recent samples.
  - 3rd Party Data.

Brae Allocation System Migration

- Project implementation - configuration

❑ Mis-measurement approach

  o All mis-measurements applied by system process – no manual entry.
  o Approved mis-measurement reports emailed into EnergySys.
  o Corrected values subject to same auto-validation as normal input data.
  o Greater visibility of adjusted values.

Gas Measurement (Brae) (60 records)

Gas Point	Production Date	Std Volume (Sm3)	Mass (t)	Energy (MJ)	Density (kg/Sm3)	CV (MJ/Sm3)	MM Number
EB-DE-SEP-GAS	30/Apr/2024 18:00:00	299300.0000	253.8000				
EB-DE-SEP-GAS	30/Apr/2024 06:00:00	299100.0000	253.3000				
EB-DE-SEP-GAS	29/Apr/2024 18:00:00	300100.0000	253.9000				
EB-DE-SEP-GAS	29/Apr/2024 06:00:00	298800.0000	252.6000				
EB-DE-SEP-GAS	28/Apr/2024 18:00:00	301500.0000	255.1000				
EB-DE-SEP-GAS	28/Apr/2024 06:00:00	291600.0000	246.3000				
EB-DE-SEP-GAS	27/Apr/2024 18:00:00	296600.0000	250.6000				
EB-DE-SEP-GAS	27/Apr/2024 06:00:00	149500.0000	125.8000				
EB-DE-SEP-GAS	26/Apr/2024 18:00:00	255000.0000	215.7000				TQ-MM-3238::26/Apr/2024 18:00:00
EB-DE-SEP-GAS	26/Apr/2024 06:00:00	309300.0000	261.6000				TQ-MM-3238::26/Apr/2024 06:00:00
EB-DE-SEP-GAS	25/Apr/2024 18:00:00	330800.0000	279.8000				TQ-MM-3238::25/Apr/2024 18:00:00
EB-DE-SEP-GAS	25/Apr/2024 06:00:00	220300.0000	186.3000				TQ-MM-3238::25/Apr/2024 06:00:00

Brae Allocation System Migration

- Project implementation – key implementation steps

❑ HYSYS interface (Data input from EnergySys/PHD, Case resolution, Output to EnergySys)

❑ Brae-Forties Pipeline Stocks Calculation

❑ OFM integration (work with IT and Subsurface teams)

❑ Reporting tools
  - Existing EC system had reports split across EC itself and Business Objects (plus Excel query reports).
    - Preference for single reporting method.
    - Business Object license tied to SAP, scheduled for termination.
  - All reporting built into EnergySys using Process Template approach.
    - Integrated reporting tool (Excel and PDF) considered but not selected.
  - Excel template allows full QA/review of all reports prior to issue - no "blind" report issuing.
  - VBA integrated within process template handles all report file distribution.

Brae Allocation System Migration

- Project implementation - configuration

Brae Monthly Reports

Save Path:	N:\Brae Commercial\GASOPS\PRS\reports\2024\Month End	Top level folder path for saving reports.	
Monthly Folder	04 - Apr	Specific month folder where reports will be saved.	
Report Status	Provisional	Report status and sub-folder where the reports will be saved.	<<< Select Report Status

Save selected reports **Toggle Select all**

Report Name	Selected?	File Type	Sheet Count	Sheet 1 Original	Sheet 1 Save Name	Sheet 2 Original	Sheet 2 Save Name	Sheet 3 Original	Sheet 3 Save Name
Brae Alpha Monthly Production Summary	Yes	xls	1	Alpha Production Summary	Alpha Production Summary				
East Brae Monthly Production Summary	Yes	xls	1	East Production Summary	East Production Summary				
Devenick Monthly Tariff Report	Yes	xls	1	Devenick Tariff Report	Devenick Tariff Report				
Enoch Monthly Report	Yes	xls/pdf	1	Enoch Monthly Report	Enoch Monthly Report				
Production Field Splits	Yes	xls	1	Production & Field Splits	Production & Field Splits				
East Brae Monthly Power Report	Yes	xls	1	East Power Report	East Power Report				
SAGE Devenick Actuals	Yes	xls	1	DevenickData	DevenickData				
T-Block Gas Import	Yes	xls	1	T-Block Gas Import	T-Block Gas Import				
T-Block Gas Export	Yes	xls	2	T-Block Gas Export 0606	T-Block Gas Export 0606	T-Block Gas Export 1818	T-Block Gas Export 1818		
Brae Third Party Production	Yes	xls	1	Third Party Production	Third Party Production				
SAGE Devenick Estimates	Yes	xls	1	DevenickEstimates	DevenickEstimates				

Side buttons: Alpha Production Summary | East Brae Monthly Production Summary | Devenick Monthly Tariff Report | Enoch Monthly Report | Production Field Splits | East Brae Monthly Power Report | SAGE Devenick Actuals | T-Block Gas Import | T-Block Gas Export | Brae Third Party Production | SAGE Devenick Estimates

Tabs: Enoch Monthly Report | Production & Field Splits | East Power Report | DevenickData | T-Block Gas Import | T-Block Gas Export 0606 | T-Block Gas Export 1818 | Third Party Production | DevenickEstimates | Save Reports

Brae Allocation System Migration

- Key implementation steps – process logic

❏ Daily allocation reporting:

   o Internal TAQA reporting.
   o SAGE reporting.
   o FPS, 3rd Party reporting.

❏ Monthly allocation reporting:

   o Monthly provisional allocations (default analysis data).
   o Monthly final allocations (with lab analysis data).
   o FPS, 3rd party reporting.

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- Testing and evaluation – development phase

❑ How to fully test such a complex system?

  - Need to capture "normal" operating scenarios and all (most?) possible alternate scenarios.
  - Real or dummy data?

❑ For development phase testing HCA team identified a selection of operating days under various scenarios:

  - All fields on.
  - Individual fields off.
  - Multiple (but not all) fields off.
  - All fields off. (Nothing tests a new system like a bunch of zeroes!).

❑ Detailed (forensic) testing at this stage – trace details through allocation log files.

❑ Key test - Allocation Calculation templates tested by running both EC and developed template against same inputs.

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- Testing and evaluation – "evaluation" and "LIVE" phase

❑ Once all development testing was complete and approved, the new system was run in our EnergySys TEST system in full:

   o Every day for **two full months**.
   o Month end Provisional and Final Allocations run.

❑ EC was run in parallel for the month.

❑ Comparison checks throughout the month and after month end.

❑ Only once this was complete, did we go fully LIVE.

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- Post-migration experience and on-going developments

❑ Generally, a very smooth experience, with no major issues.

    o Daily/Monthly routine established quickly.

❑ Various minor issues to deal with:

    o Measurement data validation (min/max data thresholds, frozen data, etc.)

    o Mis-measurement handling (over-reading vs under-reading logic, add or subtract adjustment?)

    o Syntax errors in data received from 3rd Parties/Laboratory

Brae Allocation System Migration

- Post-migration experience and on-going developments

❑ Load FPS accounts into EnergySys.

❑ ETS calculations (moved from NEMS into EnergySys).

❑ Production Forecasting and Business Planning tools.

❑ Production, flare and vent consent tracking.

❑ Implemented several allocation changes – within TAQA HCA team.

❑ Establish a new Change Management System (in EnergySys!)

❑ Changes identified during project & reactive changes

❑ Improves knowledge of the system capabilities and generates other ideas of how you can use it.

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- Lessons learned

❑ In-house vs outsourcing. Would we repeat that? **Yes, 100%...**

❑ Was it perfect? Of course not.... key issues:

- o Workload balancing. The day-job still had to be done.
- o Spreading the work thinly across many vs focused development by a few.
- o Other emerging issues taking priority.
- o Managing senior management expectations.

❑ Mis-measurement visibility / "tagging" (a good idea with some unintended consequences)

THANK YOU