Risk Model methodology

11 September 2018

Gemserv

Risk management process

CDSP | PAFA | PAC

Raw data → PARR Reports → Performance Metrics → Likelihood
Risk Model → Value At Risk (VAR) → Risk Register → Net Risk
Parameters
Risks (New or Current)
Risk Progress review → Data request
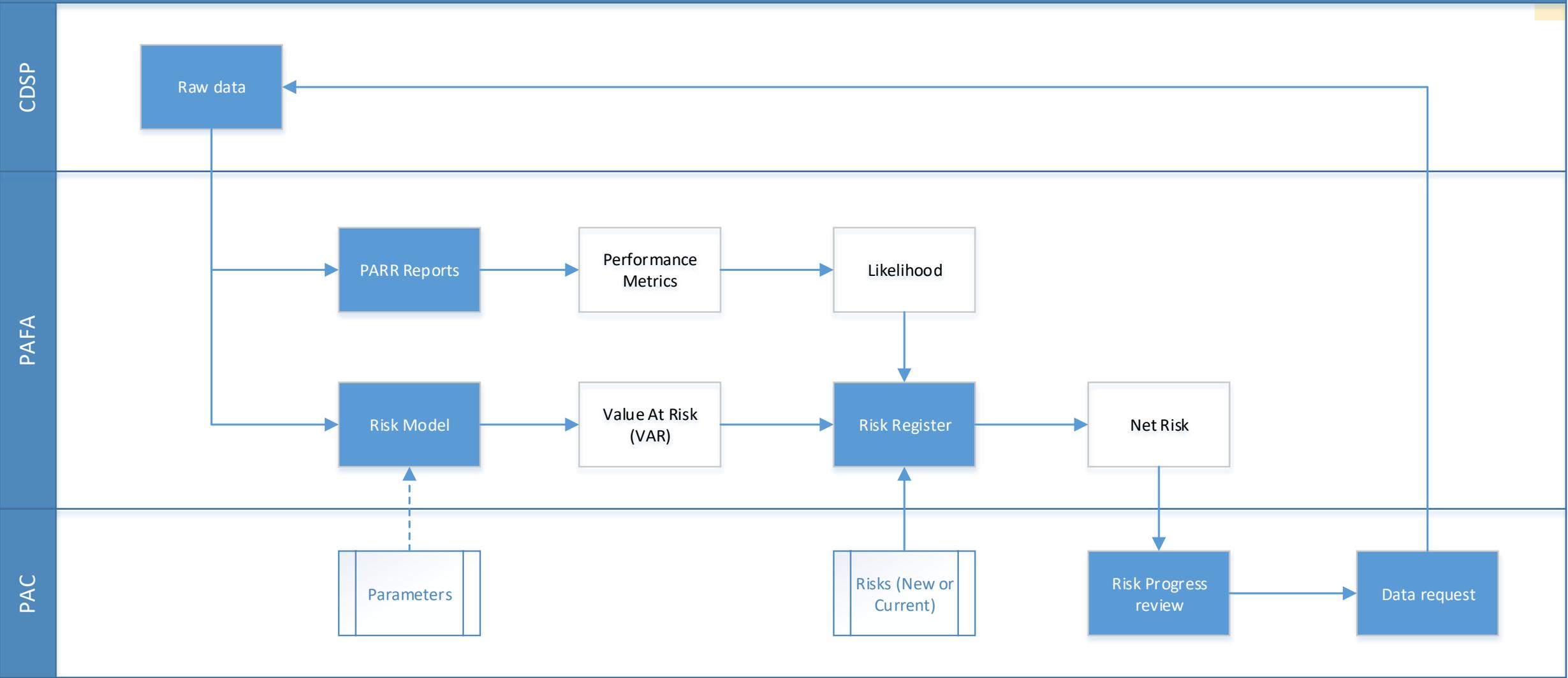
Background
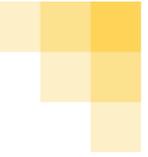
- Simulates Settlement process for an average sized LDZ with 7 Shippers

- The model is set up to replicate a gas day where there is no risk to settlements on allocation or reconciliation volume

- Uses an error distribution to identify the 1 in 20 worst-case event

- Quantifies the inaccuracy that event would create if it materialised

- The risk in kWh per day is run through the model to determine the Value At Risk and how it is distributed among Shippers in the LDZ

- The model quantifies the Value At Risk at initial allocation (D+5) and final reconciliation (after line in the sand, a maximum of M+48)

Common data
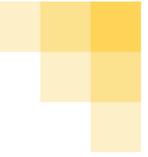
- Common and static data

- Data can be amended to create different scenarios

- Model is run separately for each risk

- Each risk has a set of parameters that can be adjusted

Calorific Value	39.3	MJ/m³
	10.92	kWh/m³
MPRNs in LDZ	2,200,000	Number
LDZ Size	18,000,000	m³/day
UIG	180,000	m³/day
Indentified Gas	17,820,000	m³/day
Average AQ	18,698	kWh/Year
System Average Price	£ 0.02	£/kWh

Shipper matrix

1 – Small Polluter	2 – Medium Polluter	3 – Large Polluter
4 – Small Polluted	5 – Medium Polluted	6 – Large Polluted
7 – Residual Polluted		

Shipper	Shipper Name	Year before model (Y-1)				Model Day				Annual share (average)				Volume Shares (of total)				Market Share
		Product 1	Product 2	Product 3	Product 4													
		P1	P2	P3	P4	P1	P2	P3	P4	P1	P2	P3	P4	P1	P2	P3	P4	Share
1	Small Polluter	0%	0%	2%	2%	0%	0%	3%	3%	0%	0%	3%	3%	0.0%	0.0%	0.4%	2.0%	2.4%
2	Medium Polluter	10%	0%	20%	1%	10%	1%	19%	0%	10%	1%	20%	1%	0.1%	0.0%	2.9%	0.4%	3.4%
3	Large Polluter	4%	10%	0%	13%	4%	10%	5%	14%	4%	10%	3%	14%	0.0%	0.5%	0.4%	10.7%	11.6%
4	Small Polluted	0%	0%	4%	4%	0%	0%	5%	5%	0%	0%	5%	5%	0.0%	0.0%	0.7%	3.6%	4.2%
5	Medium Polluted	10%	10%	10%	1%	10%	12%	10%	2%	10%	11%	10%	2%	0.1%	0.6%	1.5%	1.2%	3.3%
6	Large Polluted	4%	12%	25%	15%	4%	12%	28%	12%	4%	12%	27%	14%	0.0%	0.6%	4.0%	10.7%	15.3%
7	Residual Polluted	72%	68%	39%	64%	72%	65%	30%	64%	72%	67%	35%	64%	0.7%	3.3%	5.2%	50.6%	59.8%

	Year before model (Y-1)				Model Day				Annual share (average)			
	P1	P2	P3	P4	P1	P2	P3	P4	P1	P2	P3	P4
Product Split (Energy)	1%	5%	15%	79%	1%	5%	15%	79%	1%	5%	15%	79%

	P1	P2	P3	P4
Product Split (Meters)	0.05%	0.10%	18.00%	81.85%
	1,100	2,200	396,000	1,800,700

Value At Risk

- Value at Risk is the difference between the cost incurred between the expected scenario (Pink) and the scenario where the cumulative probability is 95% (Black)

- The Black scenario typically represents a 1 in 20 high market-polluting scenario measured at the 95th percentile mark on the most appropriate probability distribution

- Where a risk has equal and opposite effects, only half of the risk is assessed
  - Estimated transfer read is used the impact to one shipper is evaluated
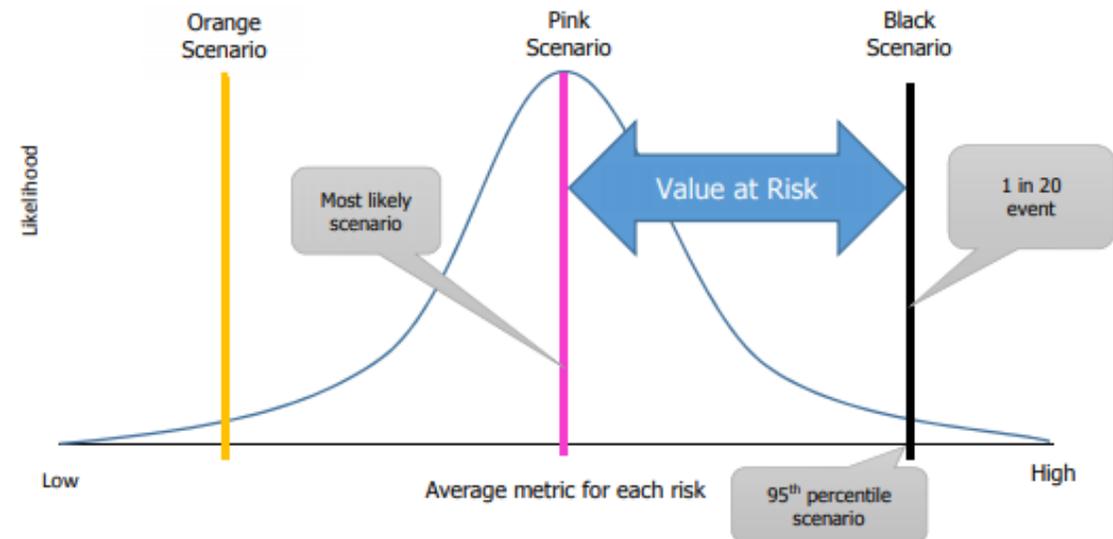
PACR014 - Failure to obtain a meter reading within the settlement window will lead to final allocation not reflecting true consumption

- Assess the risk of Shippers failing to obtain meter reads within the settlement window of 36-48 months

- Average of 42 months used for ease of use

Sample of latest meter read > 42 months	4,811	Sample provided by Xoserve of East Midlands
Total	2,191,244	Samples provided by Xoserve of East Midlands
Percentage of MPRNs with latest read outside the settlement window	0.22%	Samples provided by Xoserve of East Midlands
Average AQ 2011	20,451	Mod 81 Report 10
1 in 20 consumption change in 2011	678	Normal Distribution
Average AQ 2012	19,458	Mod 81 Report 10
1 in 20 consumption change in 2012	143.65	Normal Distribution
Average AQ 2013	19,469	Mod 81 Report 10
1 in 20 consumption change in 2013	824.05	Normal Distribution
Average AQ 2014	18,698	Common Data
1 in 20 consumption change in 2014	510.58	Normal Distribution
Total change over 42 months	1,817.43	kWh error per MPRN
Energy error for VAR	6,872	Daily kWh error

PACR014 - Failure to obtain a meter reading within the settlement window will lead to final allocation not reflecting true consumption

£000s/Year	Allocation		Reconciliation	
VAR	£	79	£	79

Supplier	Reference	Risk	Variance	%	Reference	Risk	Variance	%
Small Polluter	£ 37,100	£ 37,107	£ 6.89	0%	£ 37,038	£ 37,046	£ 7.04	0%
Medium Polluter	£ 39,468	£ 39,467	-£ 1.39	0%	£ 39,527	£ 39,525	-£ 1.58	0%
Large Polluter	£ 162,478	£ 162,511	£ 32.53	0%	£ 162,377	£ 162,410	£ 32.56	0%
Small Polluted	£ 61,834	£ 61,832	-£ 2.18	0%	£ 61,772	£ 61,770	-£ 1.95	0%
Medium Polluted	£ 49,730	£ 49,728	-£ 1.76	0%	£ 49,672	£ 49,670	-£ 1.53	0%
Large Polluted	£ 188,396	£ 188,389	-£ 6.65	0%	£ 188,522	£ 188,515	-£ 7.03	0%
Residual Polluted	£ 776,607	£ 776,579	-£ 27.43	0%	£ 776,705	£ 776,678	-£ 27.50	0%

Pink scenario   Black scenario   Pink scenario   Black scenario

List of risks
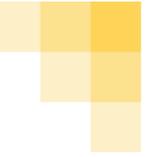
Engage Risk Model	PAC Risk	Risk Title
11	PACR001	Theft of Gas
12	PACR002	Use of the AQ Correction Process
5	PACR003	Estimated reads used for daily metered sites (Product Class 1 and 2)
1	PACR004	Identified LDZ Offtake Measurement Errors
7	PACR005	Incorrect or missing asset data on the Supply Point Register
13	PACR006	Use of Winter Annual Ratio (WAR) for End User Category (EUC) 03-08
2	PACR007	Undetected LDZ Offtake Measurement Errors
10	PACR008	Unregistered Sites
15	PACR009	Shipperless Sites
3	PACR010	Meter readings fail validation (Product Class 3 and 4)
9	PACR011	Late check reads on meters that derive a read
6	PACR012	Meter read submission frequency for Product Class 4 meter points
8	PACR013	Estimated reads at Change of Shipper
4	PACR014	Failure to obtain a meter reading within the settlement window
14	PACR015	Consistent approach to retrospective updates

Areas to be updated with new information

Shipper matrix	Common data	Risk parameters
Market share of current day and previous year	LDZ breakdown of split of size, Product Class and energy	Adjust individual risk parameters based on current situation of risk
Consumption of market share of current day and previous year	LDZ size by meter points and energy	Allocation or Reconciliation
Product Class split for each shipper	CV	
Overall Product Class split for energy and meter points	SAP	
	UIG	
	Average AQ	

Questions
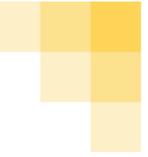
To evaluate the current state of the risk model, questions that needed to be addressed included:

- Does the risk approach capture all risks?

- Does the risk register management process capture necessary information for ongoing monitoring and reporting of data?

- Are risks relevant at present?

- Are assumptions and data behind risk modelling valid or relevant?

- Does any data sufficiently cover identified risks for risk progress reporting?

- Are performance reports adequate to assess shipper performance and gauge risk?

Assumptions

| Assumptions	PAFA Commentary
The UK Link replacement system operates in accordance to the design specified within the BRDs	This is an appropriate assumption as any differences in system operation beyond the design specified within the BRDs will impact on the risk quantification and score
CDSP cannot be subject to a performance assurance regime unless every action they complete is fully documented	Significant assumption on data quality and will need to be checked with recent data samples
A high number of read submissions or AQ corrections will not impact system performance	This assumption will need to be checked with recent data samples
Where the BRDs provide detail of several options it is assumed the preferred option in the BRD will be built	Valid and applicable assumption
A significant number of supply points will be elected into product 2 and 3 as a result of the mandated smart and AMR rollout	Assumption not validate at present time
IGTs supply points will be treated as if they follow exactly the same settlements allocation processes as directly connected sites.	This is an appropriate assumption as differences in processes will impact on the risk quantification and score
Risks have been considered following the full and complete operation of the UK Link replacement system	Valid and applicable assumption
UNC Modification 473/473A is assumed to be out of scope of this piece of work and if approved will change the current Nexus arrangements	Valid and applicable assumption

Assumptions

Assumptions	PAFA Commentary
The model will not use Shipper specific information but will simulate a simplified market structure, however real data may be used to test the effectiveness of the model	This is an appropriate assumption as a first simulation, although Shipper specific data may be requested as part of performance reporting
Information on initial volume allocation, reconciliation and profiling will be required from the CDSP to ensure the model is as realistic as possible. There is an assumption that this information is obtained in a timely manner and will be made available in advance of the model being built	Valid and applicable assumption
The current reconciliation window of up to 48 months following initial allocation will remain in place.	The assumption still applies as Modification 398 still confirms a maximum reconciliation window of 4 years (48 months)
The model will provide an illustration of the market at a specific point in time	The assumption still applies as transient behaviour is not modelled
It is assumed that pre-Nexus data cleanse activity is comprehensive and the majority of sites can be individually reconciled automatically	Significant assumption on data quality and will need to be checked with more recent data samples provided by CDSP and performance reporting. This impacts on the risk quantification and score.
The Project Nexus BRDs do not document sufficient detail to enable a full analysis of the transitional period between 1st October 2015 and 30th September 2016	This is an appropriate assumption as outcomes from transitional arrangements may lead to risks not captured in the model
Co-operation between Transporters, Shippers and CDSP will be necessary to improve data quality and ensure a smooth transition and wherever possible accurate settlement of gas	Valid and applicable assumption
Characteristics of the small, medium and large shippers portfolio will be partly determined using the Mod 81 report. An approximation of AMR and smart metering uptake will be used to determine the split between product 2, 3 and 4.	This is an appropriate assumption and will need to be checked with recent data samples

Findings and Recommendations
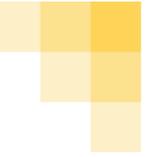
- No modelling of rules or data input risk

- Data and parameters not updated so impacts not known today

- Product classes have likely changed as Shippers take advantage of new UK Link functionality

- Averages used in model

- All values to be updated

- Review of all underlying data and assumptions built into the model

Expansion of Risk Model
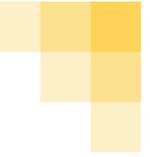
- Future risks

- Model more than 7 Shippers within an LDZ

- Model multiple LDZs as a simulation of the whole market

- Real time monitoring of the market

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