

IT Architecture

Session 4a
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UK Power Networks & CGI

Agenda



- Before Low Carbon London
- Our partners
- The journey through LCL
- Lessons from the trials
- In the future – post 2030

Low Carbon London

Importance of Information Technology

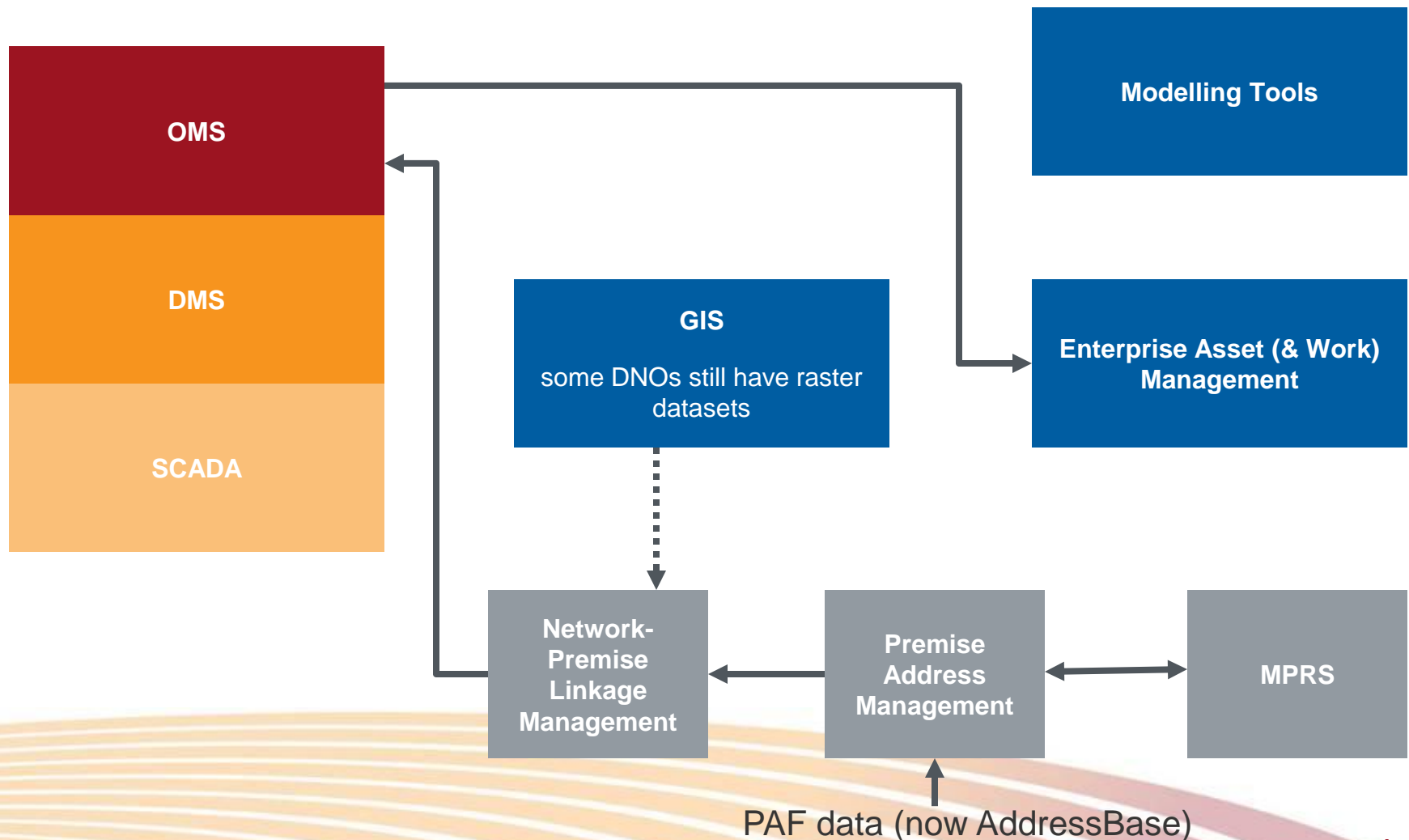


- The project that has trialled and demonstrated a broad range of smarter potential approaches to how DNOs may invest and operate in the future.
- LCL has brought together leading industry specialists to emulate the 2020/2030 electricity supply chain.

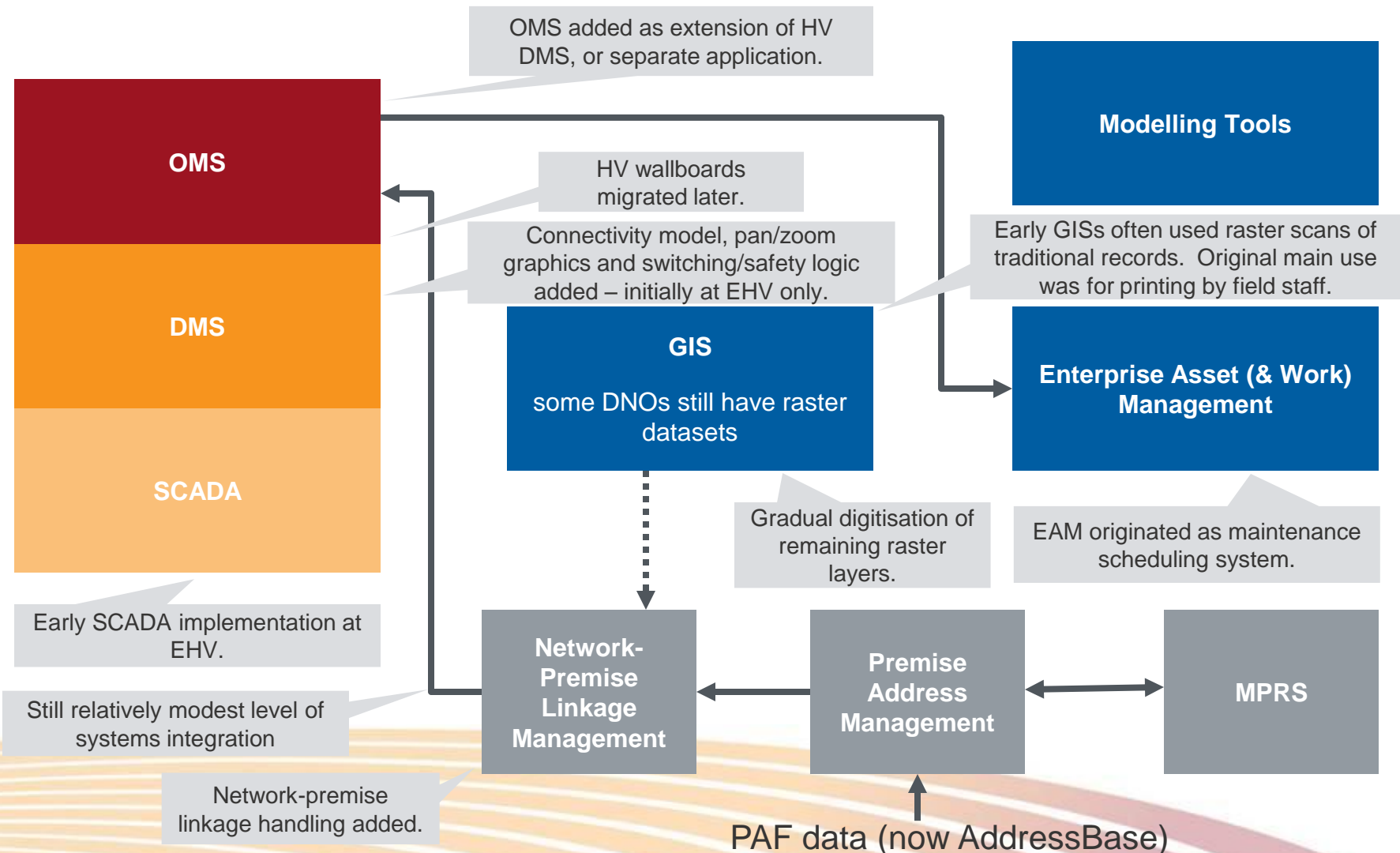


- IT/OT requirements and architectures for smart grid management techniques will be relevant to:
 - Network monitoring;
 - Smart meter utilisation;
 - Forecasting;
 - Planning;
 - Control and operations; and
 - Commercial aspects such as billing and settlements.

Typical historical UK DNO IT architecture development



Typical historical UK DNO IT architecture development

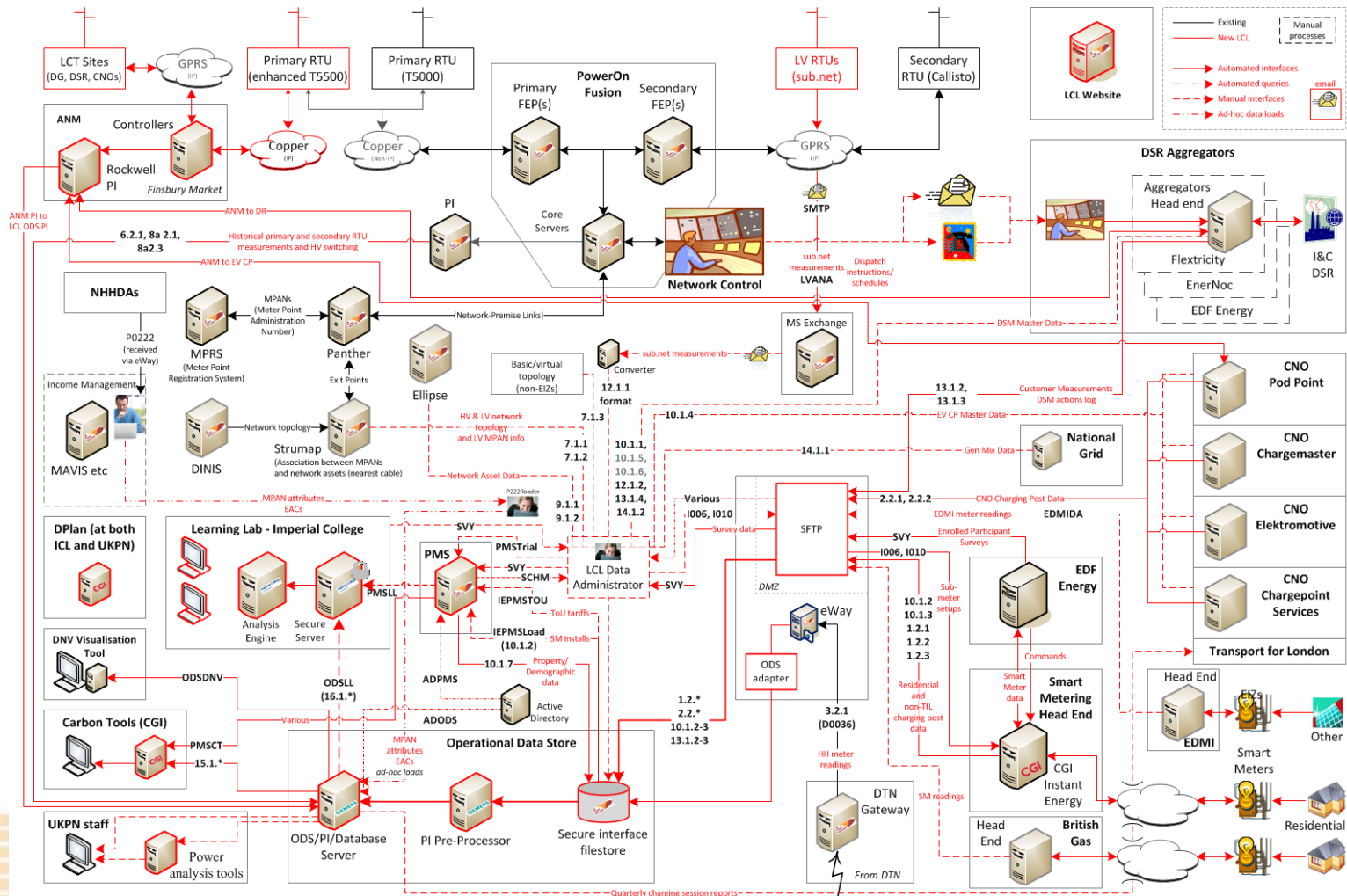




Low carbon
LONDON
Energising change



Low Carbon London Logical Architecture



Source: LCL Report D2

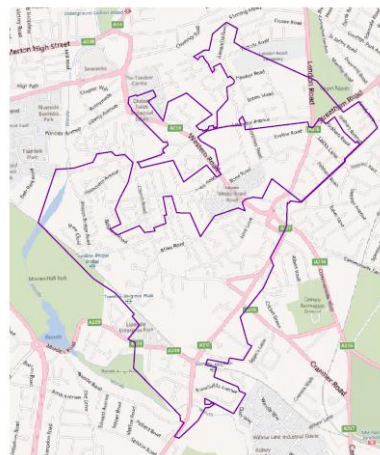
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LCL Engineering Instrumentation Zones

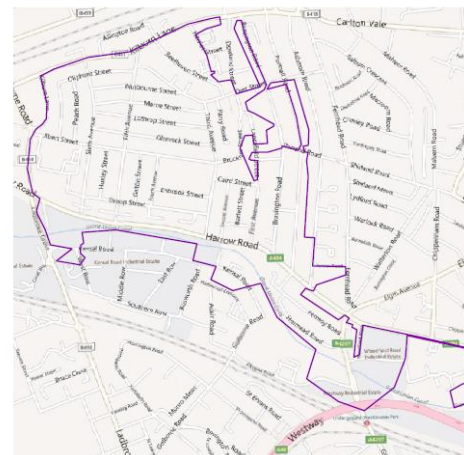
- Three EIZs: Brixton, Merton and Queen's Park.
- c. 31,000 MPANs across the three EIZs
- 106 meters located at the end of feeders: proxy for voltage measurements at LV customer premises



a) Brixton

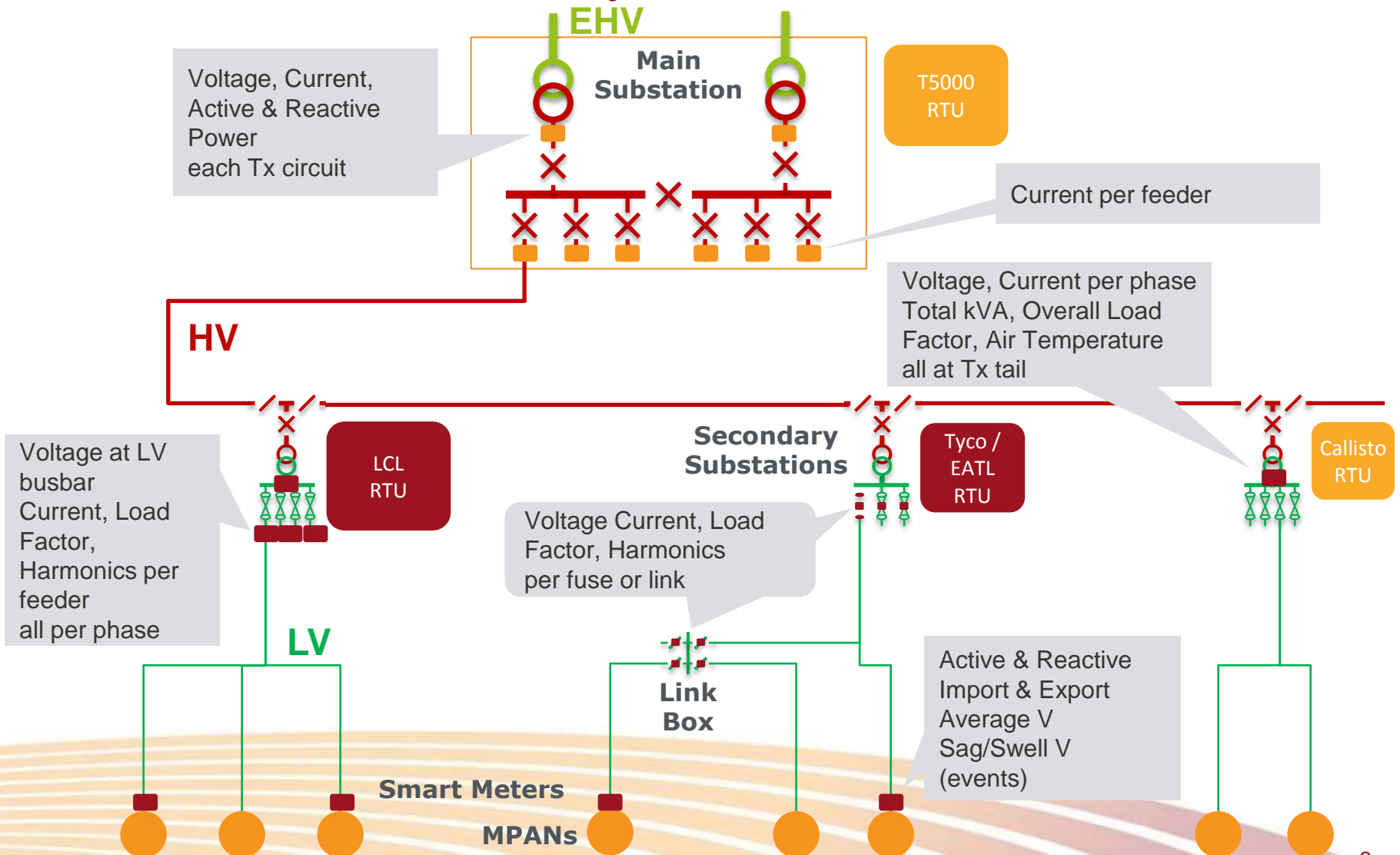


b) Merton



c) Queen's Park

Network Visibility & Data Collection – History



Data integration and quality

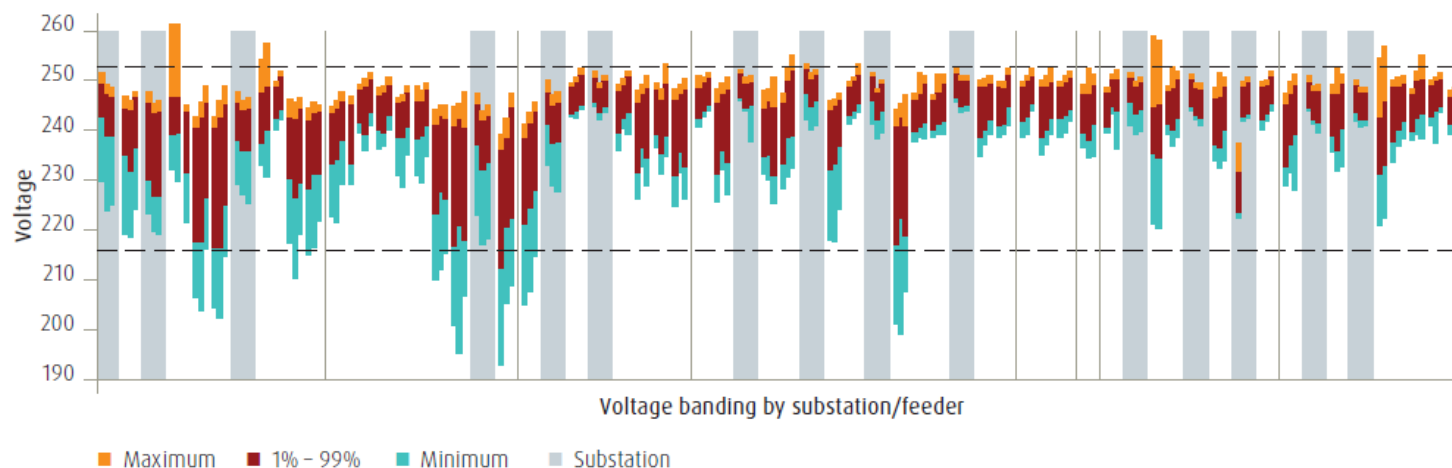
Key findings



- Integrated network topology & asset model needs data combined from several source systems – not straightforward, some level of record ID mismatches
- Network-premise connectivity data is the hardest to achieve high quality
 - ...but HH MPANs and those of PCs 5-8 offer low-hanging fruit for improvements: <1% of all premises, but PCs 5-8 each consume as much as 39 domestic premises and HH MPANs even more.

Building on initial LCL analysis (C1)

- Only 0.35% of all the phases measured showed more than 1% of readings outside of statutory limits using 10 minute data resolution
- Voltage on the London network is towards the higher end of the allowable limits
- Lower voltage limit is responsible for more voltage excursions currently



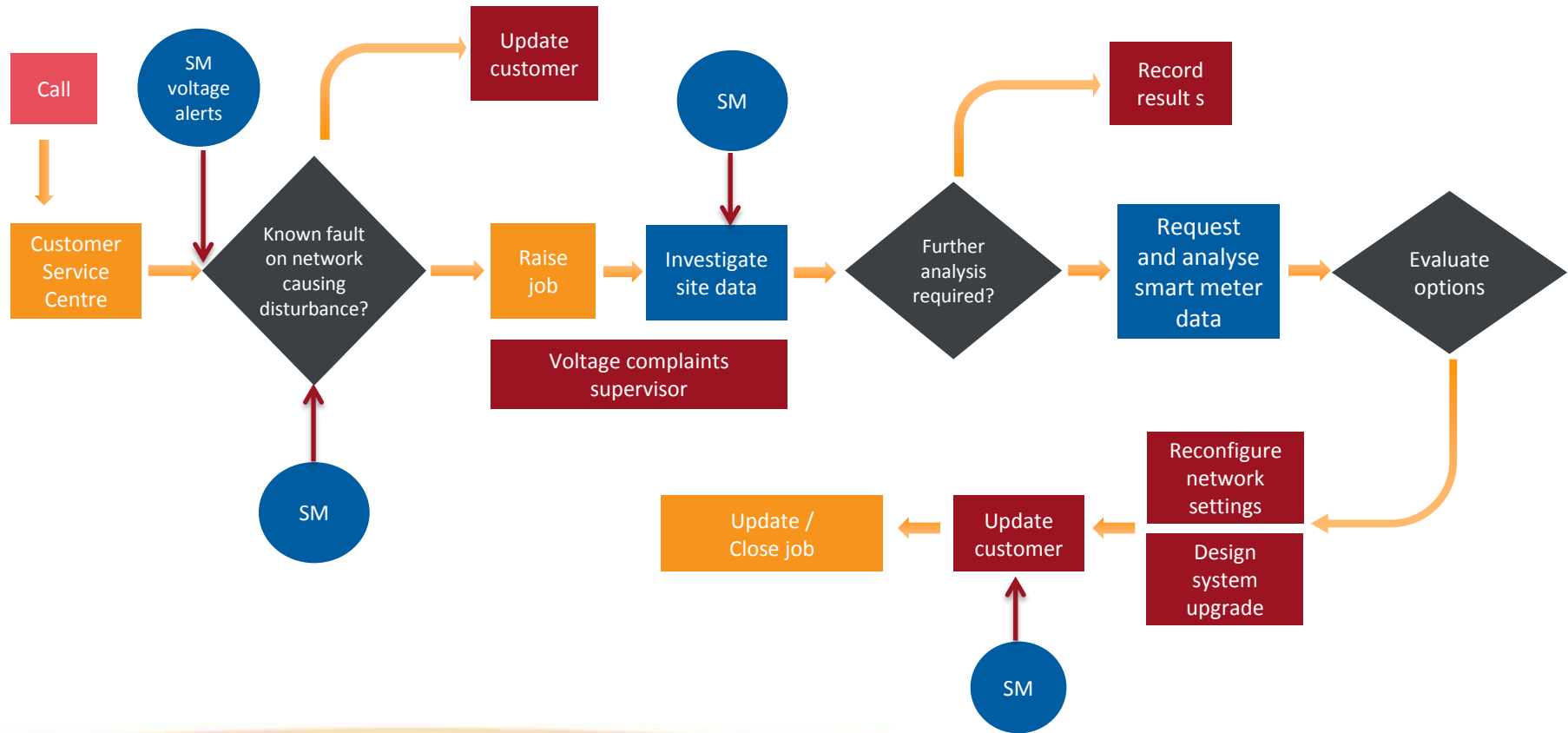
Sensitivity analysis

Alerts per year for EIZs

Voltage limits: very high extreme above the statutory limits (+14% / -10%), the statutory limit (+10% / -6%) and two levels under that (+12% / -8% and +8% / -5%)

	# alerts /yr					
	10 min duration		30 min duration		60 min duration	
+8% / -5%	High:	121,453	High:	56,445	High:	26,194
	Low:	2,647	Low:	1078	Low:	653
	Total:	124,100	Total	57,523	Total:	26,847
+10% / -6%	High:	61	High:	1	High:	0
	Low:	1,563	Low:	691	Low:	499
	Total	1,624	Total:	692	Total:	499
+12% / -8%	High:	11	High:	0	High:	0
	Low:	641	Low:	414	Low:	367
	Total	652	Total:	414	Total:	367
+14% / -10%	High:	1	High:	0	High:	0
	Low:	415	Low:	355	Low:	332
	Total:	416	Total:	355	Total:	332

Power quality management process



Future Scenarios



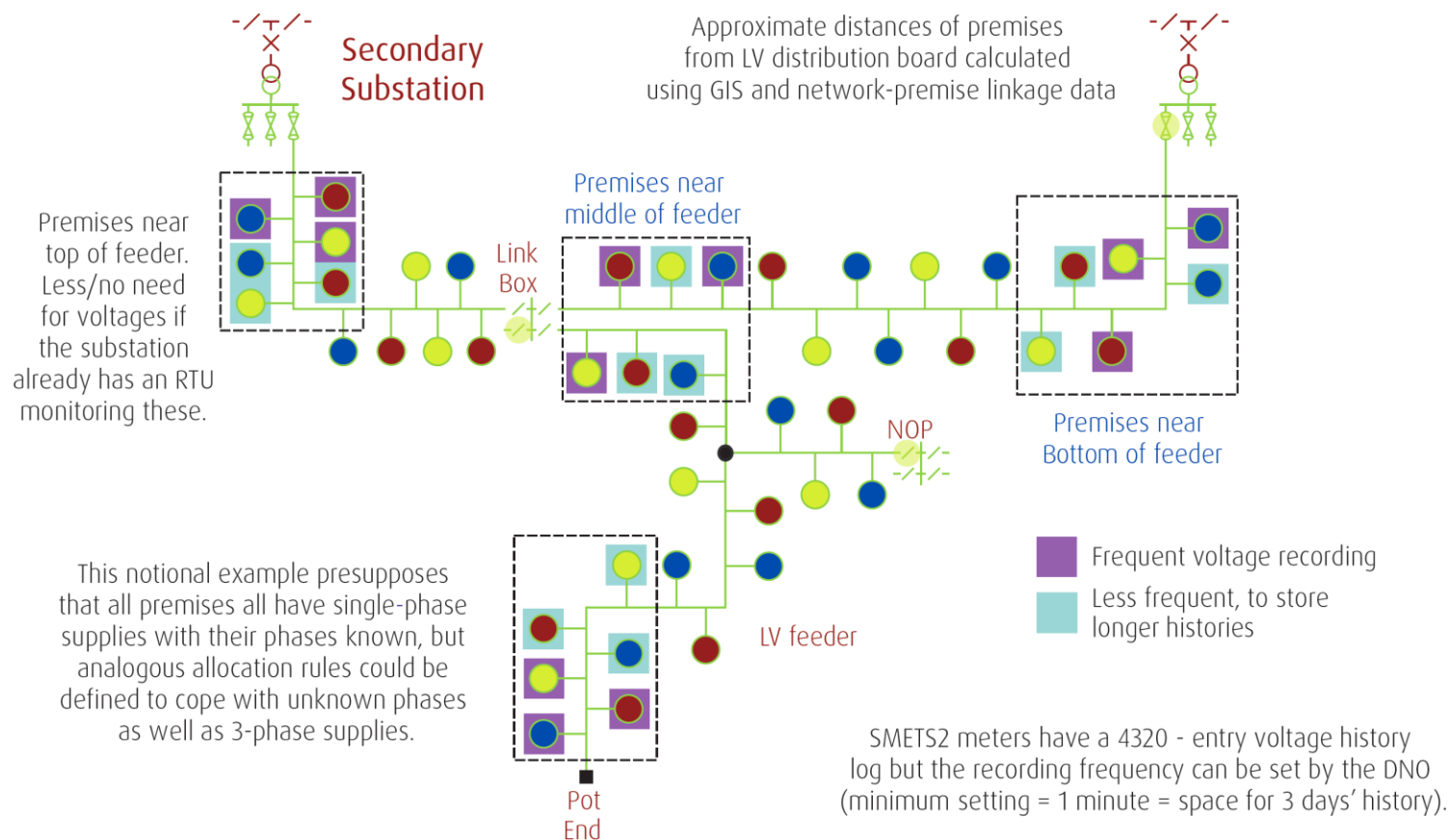
LCL Report D2 studied two future scenarios:

Scenario	Period	Date	Description	Characteristics
A	Late ED1	2021	High-Confidence Near-Term	Post-SMIP; DSR use; conservative LCT take-up estimates
B	ED2	2027	Longer-Term	More optimistic take-up estimates; includes ANM

Today's presentation is focussed on Scenario A.

Smart SM voltage reporting configuration

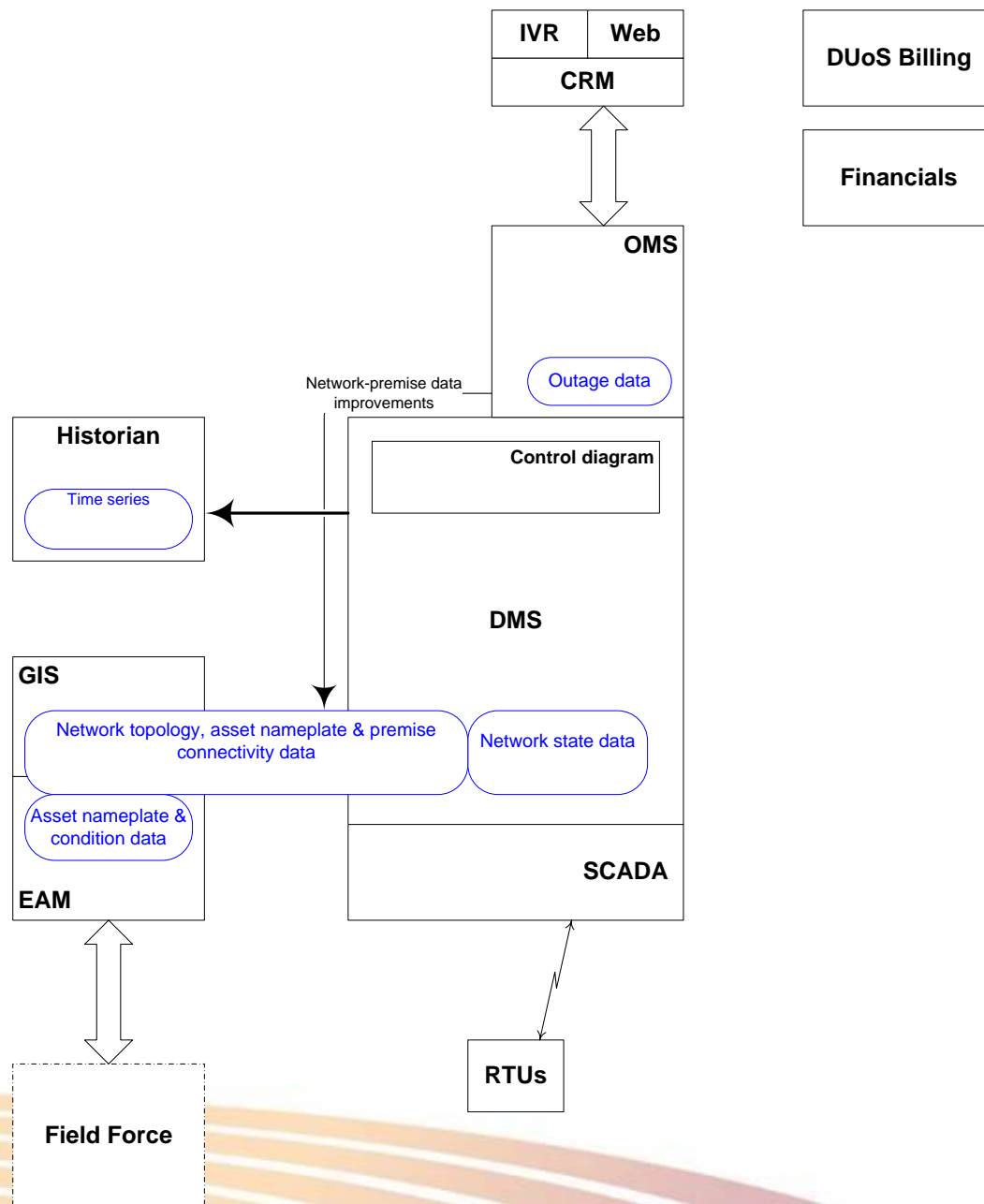
Smart SM configuration – idealised example



DNO IT/OT Architecture Evolution

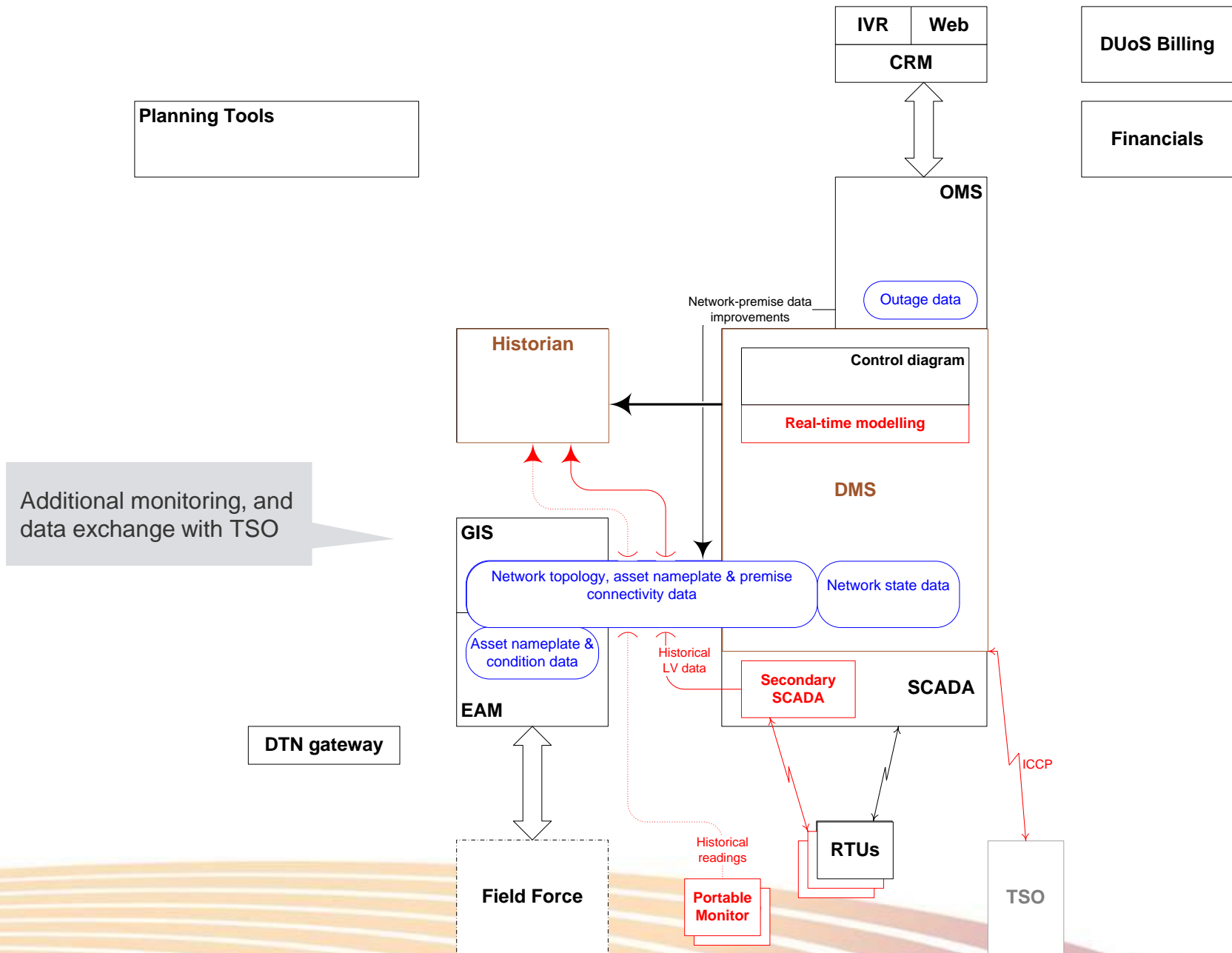
Planning Tools

DTN gateway



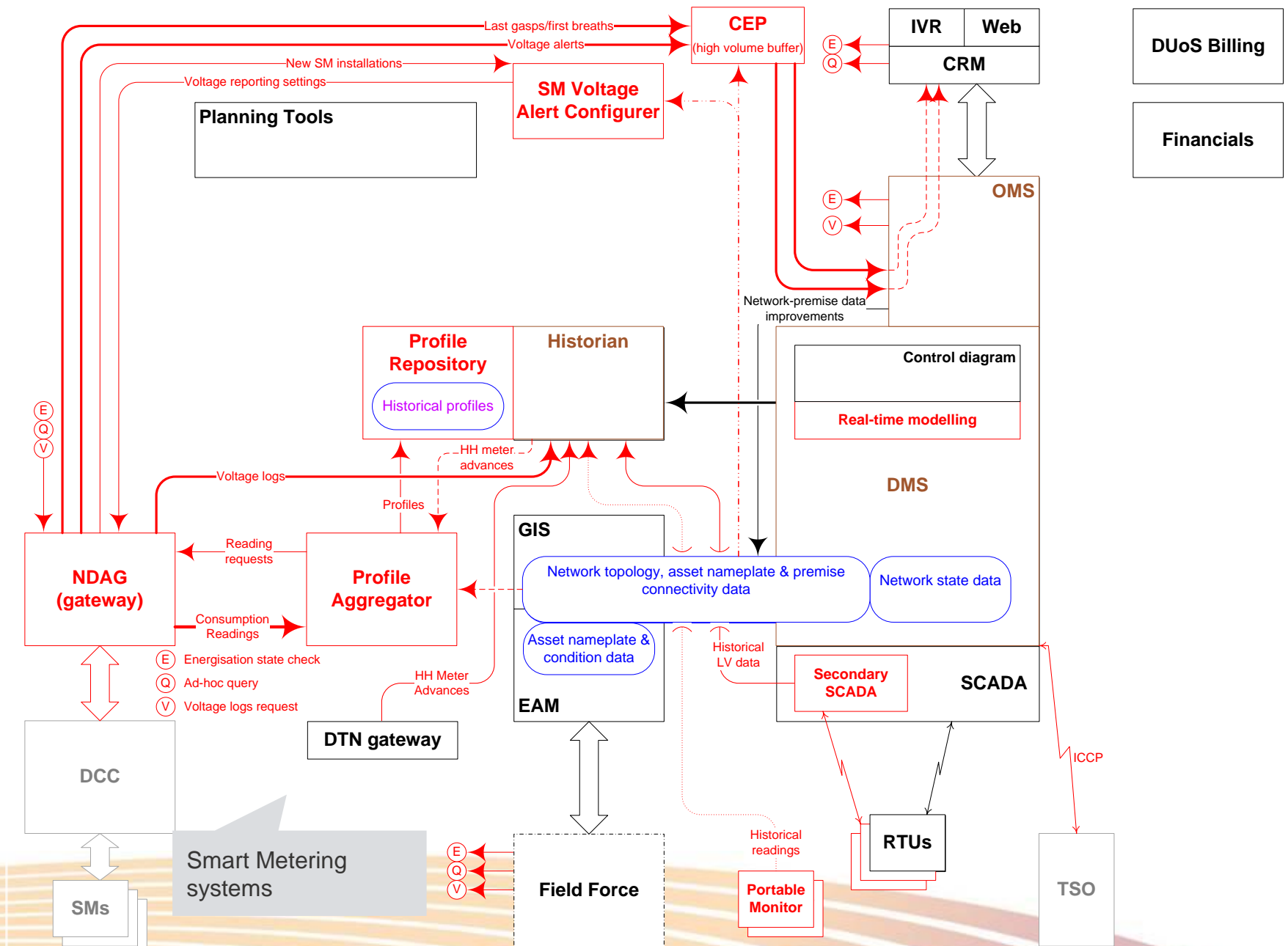
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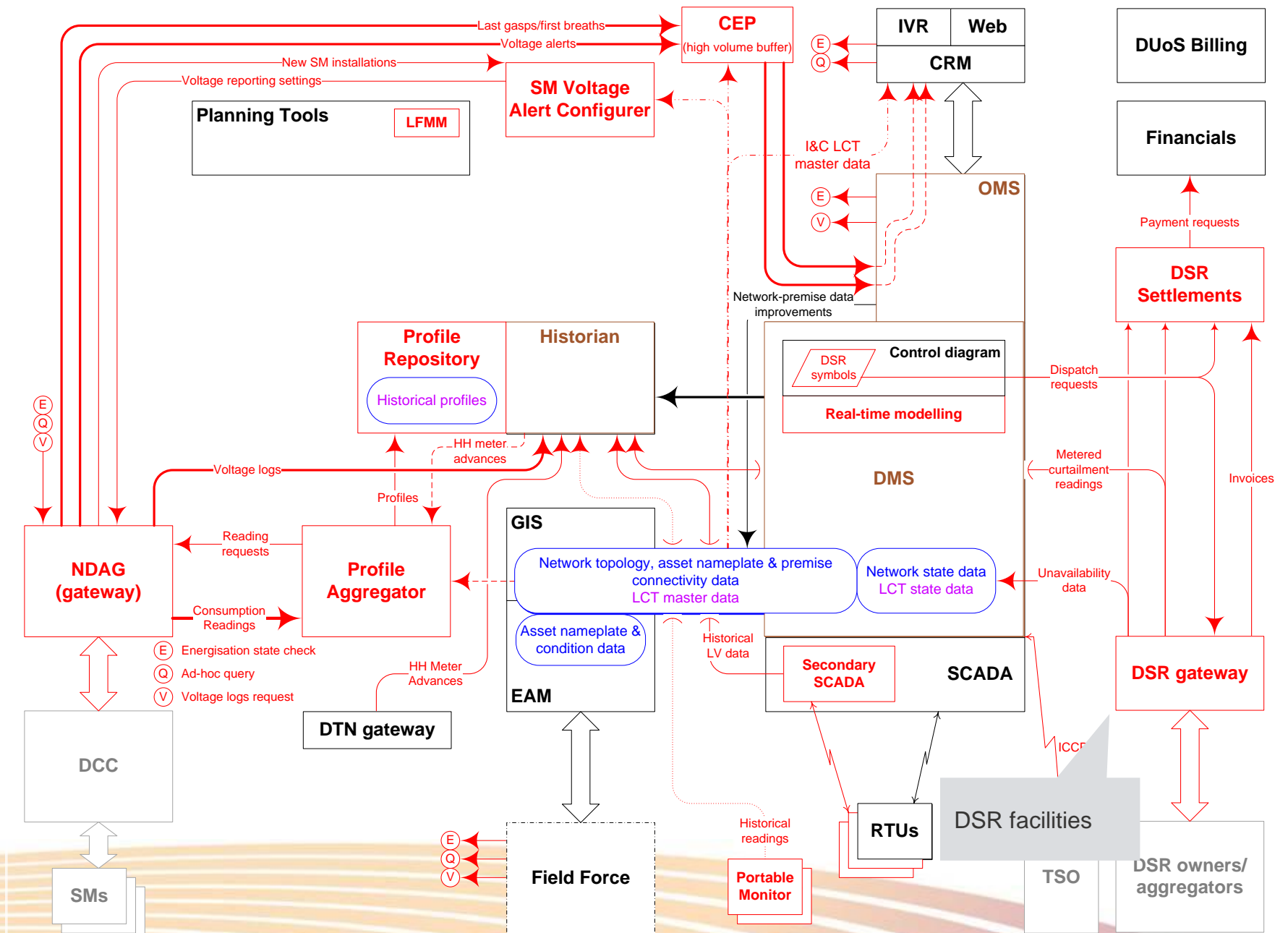


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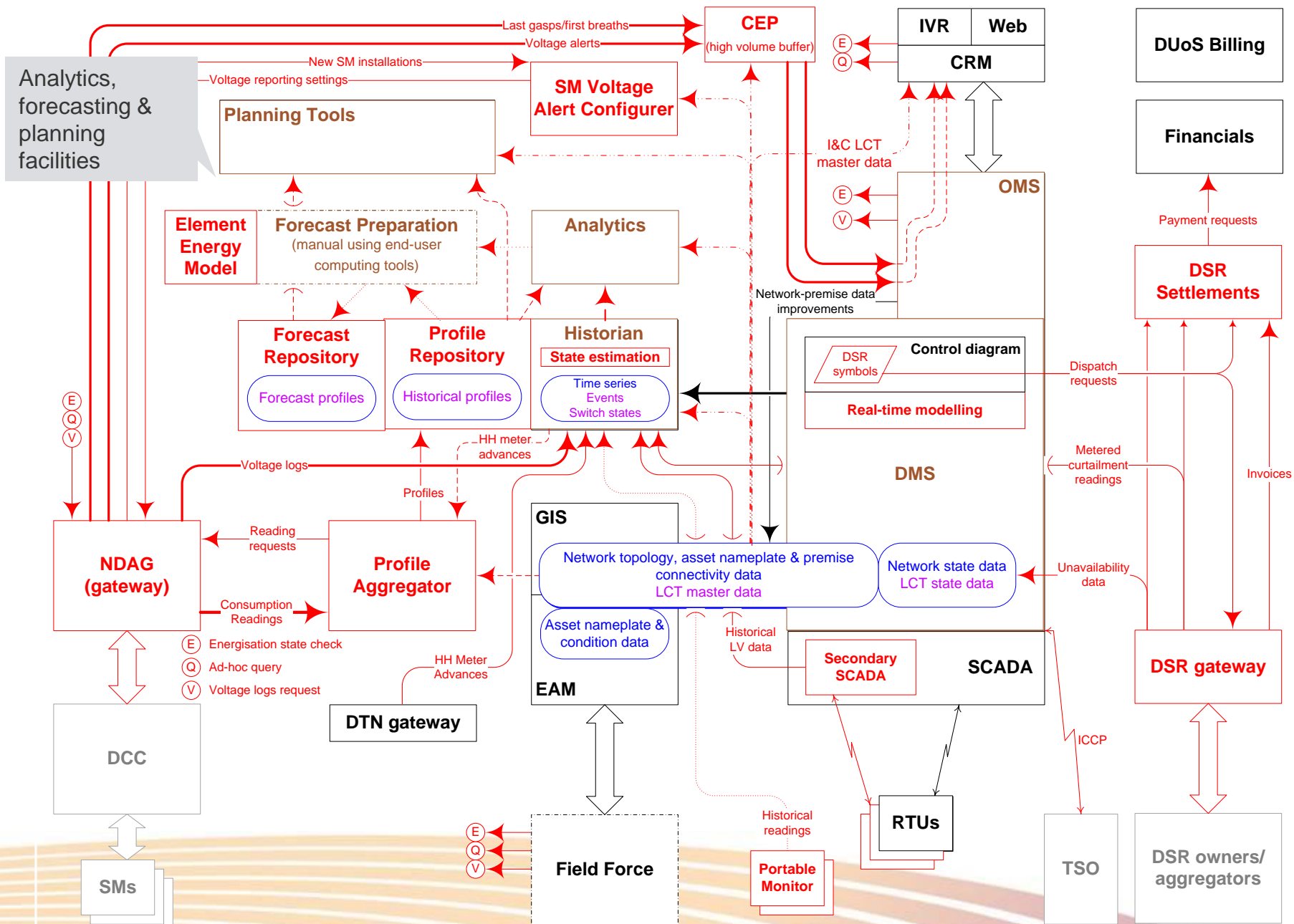


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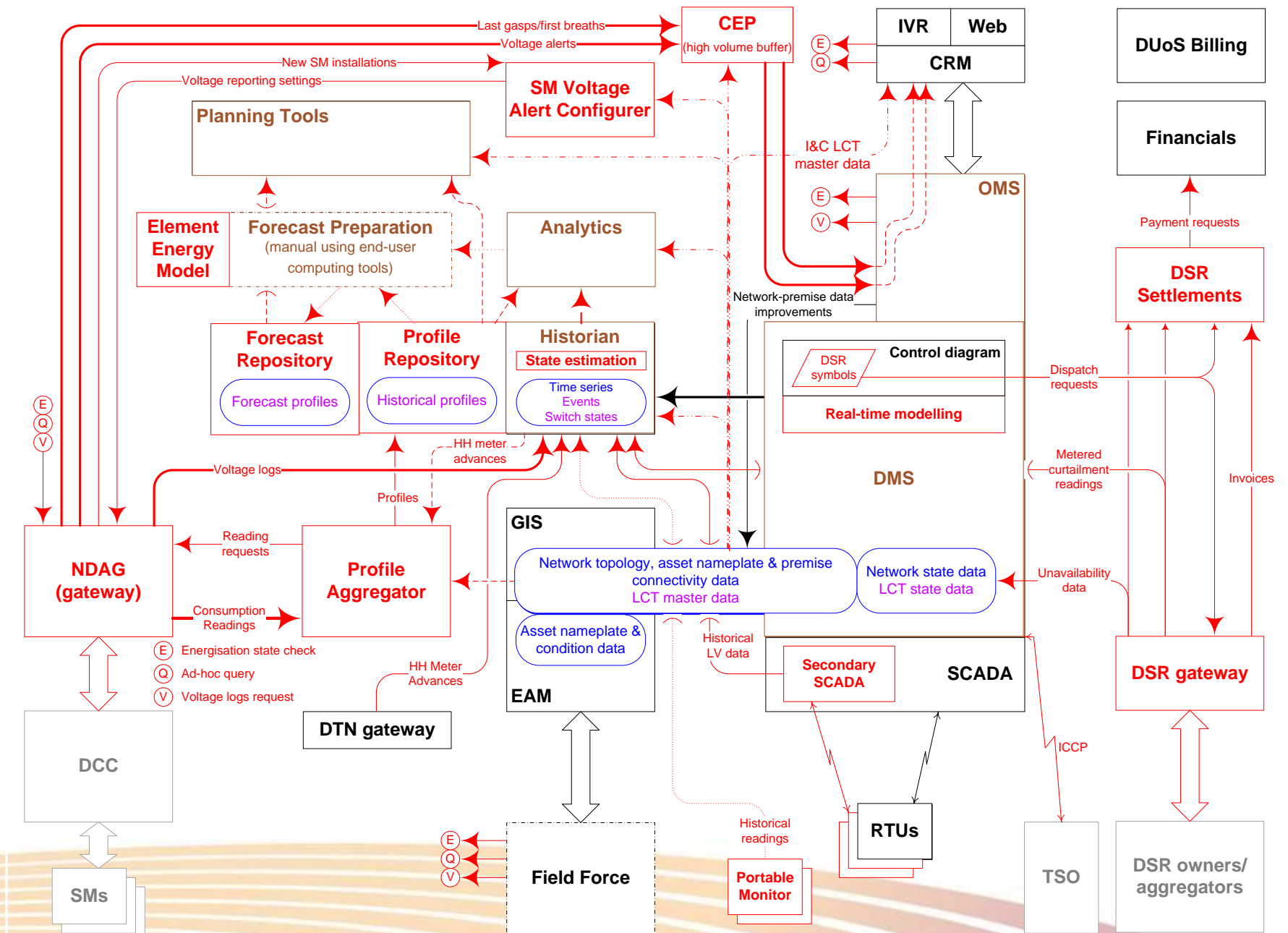


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Recommendations



- System changes are likely to be incremental and evolutionary rather than radical
- Increasing need for a fully integrated network topology/asset/premises model, with LCT data linked into this
- Most high-volume metering/measurement data need only be collected selectively when/where required
- Investment in additional network monitoring should be targeted at networks close to capacity or with significant LCT adoptions
- Smart Meter data will help considerably with outage and voltage excursion management, and assist forecasting and planning for networks that are approaching the monitoring threshold
- Standardisation will increasingly be beneficial – the interfaces between DSR participants are a good example.

ukpowernetworks.co.uk/innovation



The findings from **Low Carbon London** represent a step change in understanding the electricity network required for a low carbon future.

If you would like to know more about our reports please email us:
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Partners:



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