CBRM
Condition Based Risk Management
Investing in optimal network performance
“Condition Based Risk Management’s greatest strength is that it enables users to make more intelligent business decisions on asset management. It is ultimately a financial planning and a network performance tool.”

What is Condition Based Risk Management?

Condition Based Risk Management (known as CBRM) is a powerful process that enables companies to use current asset information, engineering knowledge and practical experience to predict future asset condition, performance and risk for their network assets.

EA Technology has developed the concept of CBRM into a comprehensive management methodology, which is well proven by users worldwide and ready for immediate implementation.

Who should use CBRM?

Our CBRM solution is purpose-designed for asset managers and asset management engineers who are responsible for most types of low-voltage, medium-voltage and high-voltage electrical assets.

CBRM provides users with greatly enhanced abilities to make more intelligent business decisions on both the day-to-day operation of their networks, and their long term investment programmes.

Why use CBRM?

The development of CBRM originated from two key drivers, which have increasingly become interlinked.

Condition-based asset management

To manage the renewal of ageing networks cost effectively, it is vital to define current asset condition and link this to current and future performance.

The management of networks is being transformed by the systematic use of practical knowledge and experience (of degradation, failure, condition assessment, effects of environment, duty, maintenance history etc), combined with improved information management and increasingly effective non-invasive condition assessment techniques.

Risk management

The facility to quantify and manage risk is increasingly recognised as a primary business driver, both by electricity company managers and industry regulators. The development of more sophisticated ways to factor the risks and consequences of failure into condition-based asset management has made our latest CBRM solution an extremely powerful management system.
CBRM example

This example of CBRM modelling shows how projected annual risks would change over 20 years for an operator with 22,000 km of 11kV underground cable, assuming no investment.

Risk is quantified in US$millions.

Using the above model, the increased future risk is clearly identified and the mitigating effect of various intervention strategies can be considered. CBRM then provides a documented and transparent decision-making framework that enables the optimum network investment strategy to be identified.
How CBRM works
SIX steps to smarter asset management

Step 1:
Systematic collation of available information to define asset condition, includes:
- Results of specific condition assessment procedures
- Practical knowledge and experience of assets

Step 2:
Derive a health index (HI) for each asset, apply CBRM methodology to:
- Link current HI to Probability of Failure (POF)
- Predict future HI and POF (of individual assets)
- Estimate future failure rates (for groups of assets)

Step 3:
If necessary identify critical information gaps and cost effective means to improve condition related information:
- Maximise information retrieval from routine inspection and maintenance activities
- Application of latest non invasive instruments and techniques
- Expert data interpretation
Step 4:
Quantify risk for each asset by combining POF/ performance data with user specific inputs on:

- Consequences of failure
- Criticality of the asset

Step 5:
Model future risk over time, using multiple investment scenarios:

- With maintenance intervention or replacement
- Without maintenance intervention or replacement

Step 6:
Use CBRM’s versatile risk models to create management information which can be used to:

- Define and justify future spending requirements
- Influence corporate decision making
- Optimise risk profile
What is ‘risk’?

‘When prioritising assets for replacement, the ones in worst condition may not be the ones that present the biggest risk’

Definition
Risk in the context of CBRM is defined as ‘the possibility of loss or misfortune, arising from the failure of a network asset’.

The four primary risk categories used in CBRM are based on electrical transmission and distribution network operators’ common business drivers:

**Network Performance** – outage frequency and time (customer minutes lost and customer interruptions)

**Safety** – fatalities and injuries

**Financial** – monetary losses and additional costs

**Environmental** – oil loss, SF6 escape, pollution from fires etc.

Secondary categories, including loss of reputation and regulatory or legal compliance, generally arise from the primary risk factors.

Quantification
The basic unit of risk quantification is financial, because all the risks factored into CBRM have cost implications.

**CBRM calculates the costs associated with risk on the basis of:**

**Consequences of failure**
This uses the operator’s average cost of failure of each type of asset and/or incident over the previous 10 years to evaluate the cost of future risks. It includes safety and environmental consequences as well as performance issues.

**Criticality of assets**
This factors in the importance of each individual asset (in each of the ‘consequence of failure’ categories) relative to other assets e.g. the criticality of risk in one transformer, in relation to other transformers.

**NOTE:** EA Technology’s CBRM model recognises that the costs associated with each of the risks above vary considerably between different network operators and countries, so they can be weighted accordingly.
EA Technology has effectively been at the forefront of developments in CBRM for more than 40 years:

- **Experience** We have been in the asset management business since we were originally established in 1966, as the research and development arm of the UK electricity industry. We continue to develop solutions in close partnership with network operators worldwide.

- **Knowledge** Our database of patterns of deterioration in network assets is unrivalled – built up from thousands of results over decades. We also have exceptional abilities in converting raw condition data into valuable management information.

- **Technology** We are world market leaders in instruments for live assessment of asset condition, especially in the field of measuring Partial Discharge (PD) activity. Our best-selling UltraTEV Detector™ won the Queen’s Award for Innovation in 2007 and is supported by a comprehensive portfolio of condition assessment tools unique to EA Technology.

- **Consultancy** We have developed our CBRM solution in close collaboration with network operators across the world, as a fully comprehensive asset management solution. It is supplied fully supported by our Consultancy Business, which has experience of tailoring it to the requirements of individual network operators worldwide.

**The global CBRM community**

EA Technology’s CBRM solution is increasingly the first choice of asset owners across the world for:

- Compliance with statutory and corporate asset management requirements
- Capital budgeting & prioritisation
- Risk management
- Maintenance optimisation
- Network performance
- Privately owned asset intensive businesses
- Regulated asset intensive businesses
Contact

EA Technology Consulting Limited
Capenhurst Technology Park
Capenhurst
Chester, UK
CH1 6ES

t. +44 (0) 151 347 2419
consulting@eatechnology.com
www.eatechnology.com

A member of the EA Technology Group