



Transformer Reliability – Taking Predictive Maintenance to the Next Level

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AEP

AEP is one of the largest electric utilities in the U.S., serving nearly 5.4 million customers in **13** states.

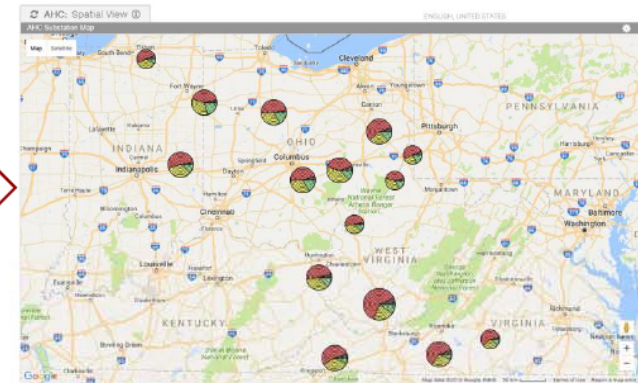
- A more than 40,000-mile electricity transmission network – the largest in the nation.
- More 765-kilovolt extra-high voltage transmission lines than all other U.S. transmission systems combined.
- Approximately 26,000 megawatts of generating capacity.

AEP

AHC Application

Operational,
Sensor, Inspection,
and Equipment
Data

Asset
Health
Center



Web Based Interface – Data Trending and Visualization

Health Score

Replacement Priority

Maintenance Priority

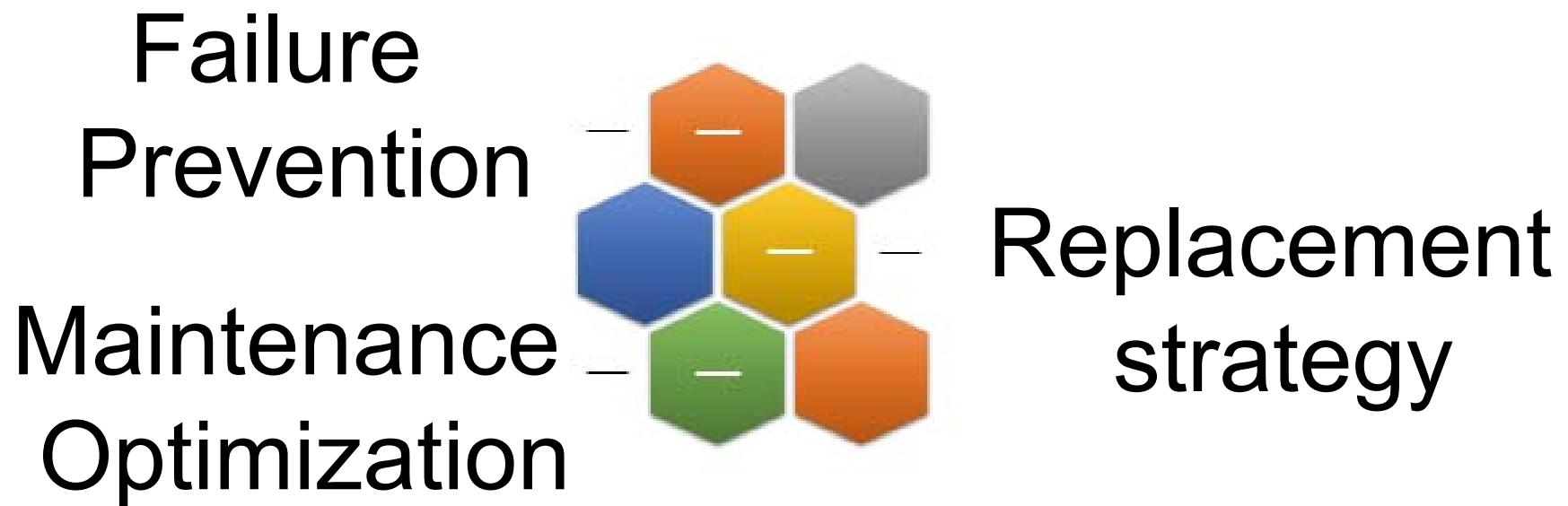
Mobile Application

AEP

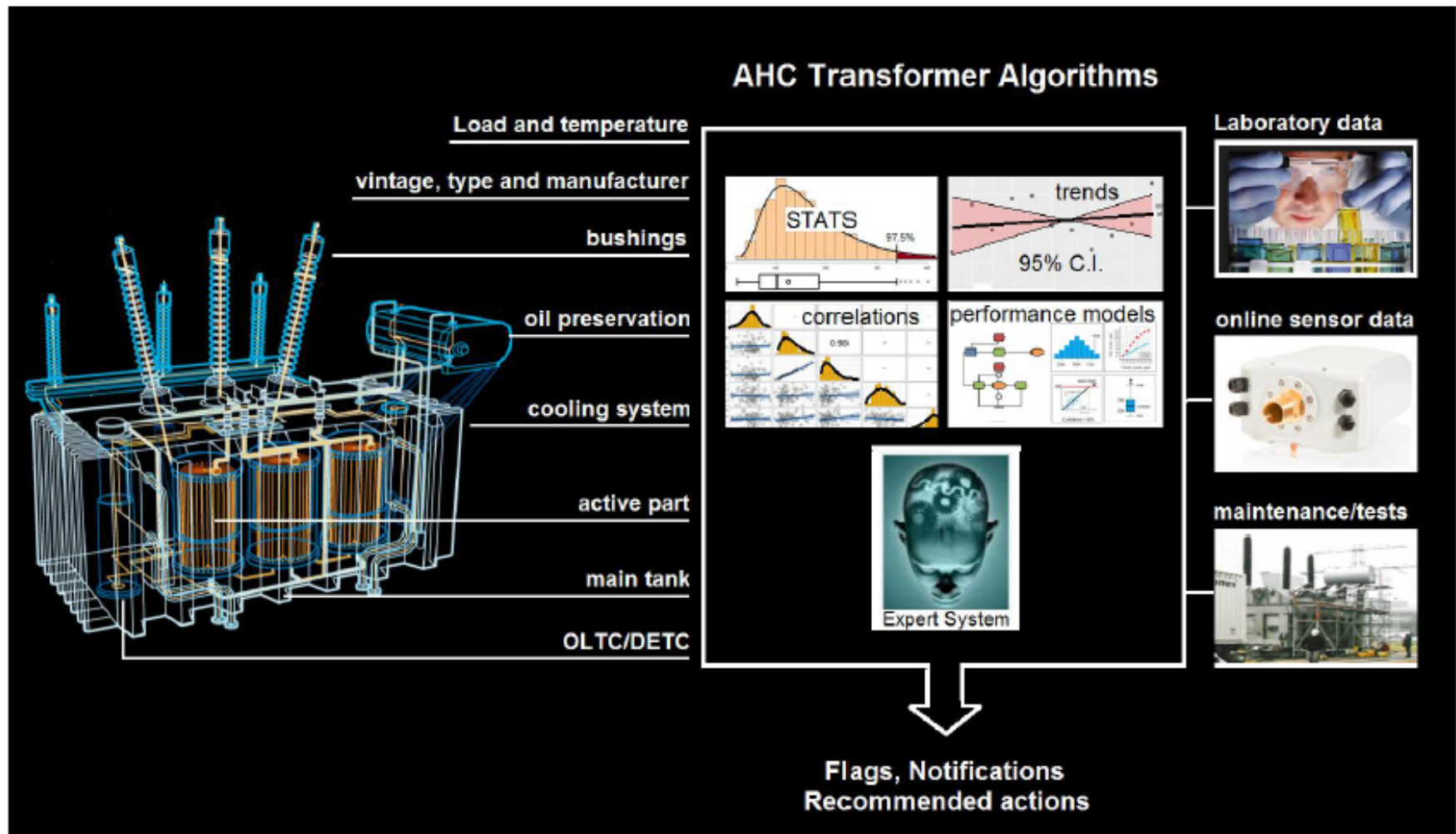
Change Agents & Management

- ✓ Management Support
- ✓ AEP AHC team is a CHANGE AGENT for AEP Transmission
- ✓ Dedicated AHC team to implement project
- ✓ Dedicated Regional AHC employees to train stakeholders
- ✓ Share the Business Case with ALL stakeholders
- ✓ Assume success and then share the successes at all levels
- ✓ Become ingrained in the process and culture of AEP
 - ✓ Create standards for monitoring packages
 - ✓ Create standards for monitoring deployments
 - ✓ Create standards for AHC software usage
 - ✓ Become critical to AEP (failure prevention, safety, maintenance optimization, and asset renewal prioritization)

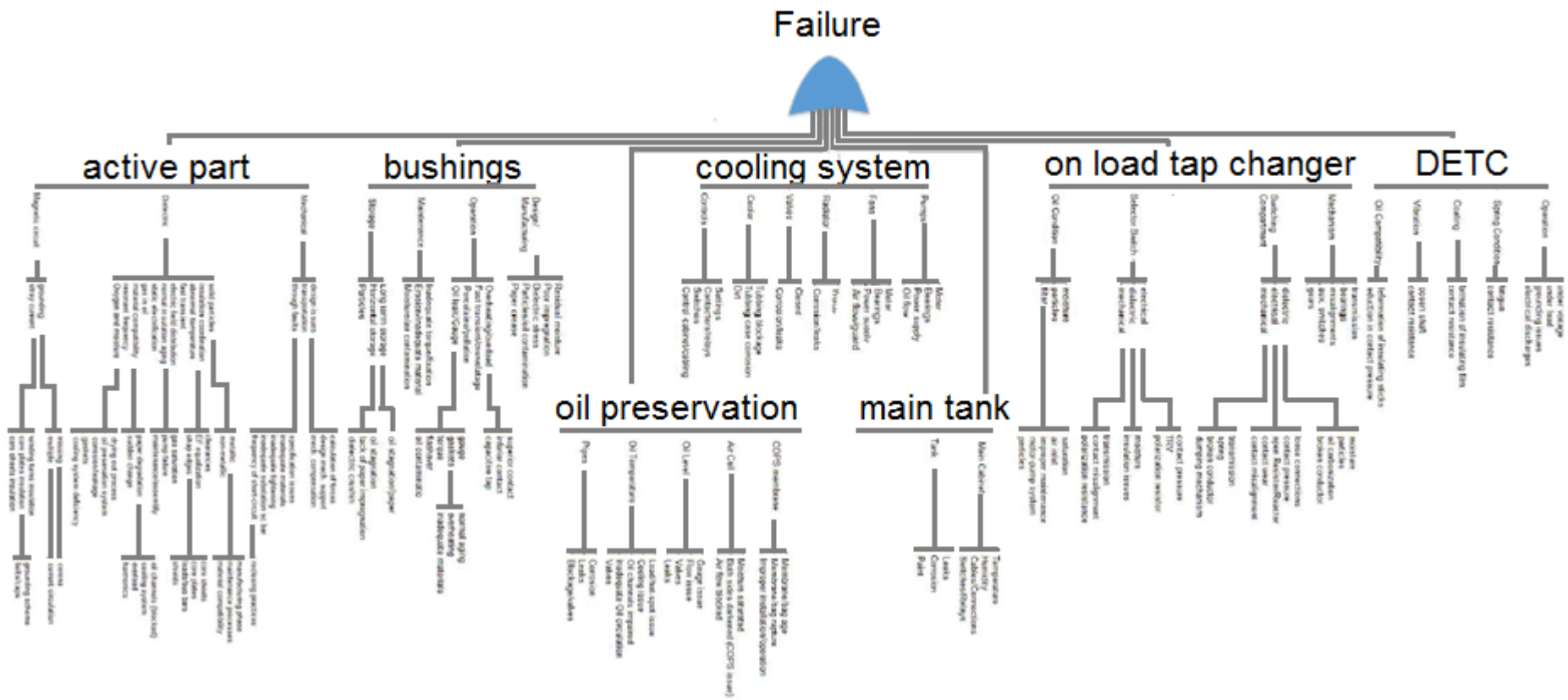
Objective of AHC Project:



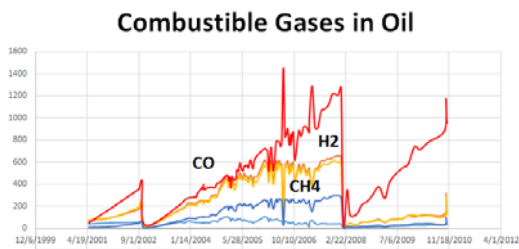
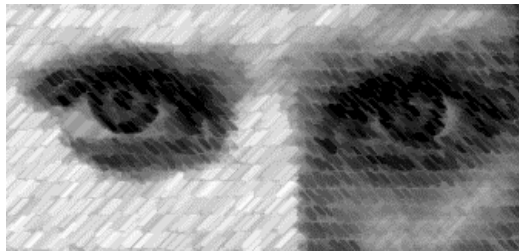
Building the trxf solution:



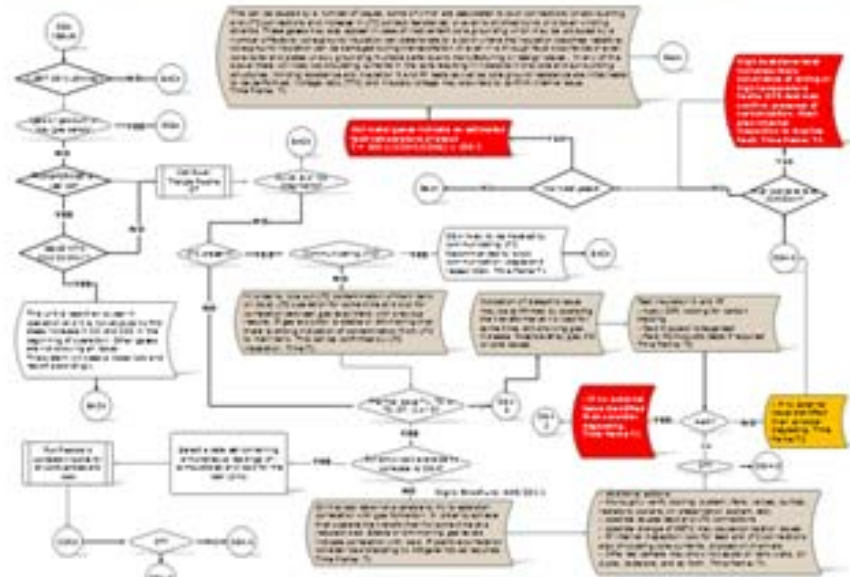
Failure mode algorithms



The eyes of the expert...



AHC is «human-blind»



AHC Top View (enterprise):



Figure 6 – The asset health solution top level screen of the solution showing classification of transformers and other assets in the red (requiring immediate attention), yellow (requiring some attention but not urgent) and in the green zones (may require attention but does not impact operational risk as is).

Asset Detail View:

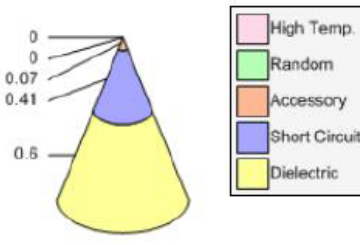
FocalPoint Composite WebPart - Internet Explorer

Asset Details [Transformer: AMOS 765KV | Transformer | 765 | 5 BANK (PH 1) PH 1 | PH 1]

Asset ID : AEM30125	Utility : AEP	Manufacture Date : Jan 01, 1991	Status : In Service
Nominal Voltage : 765 kV	Station : AMOS 765KV	Age : 26 Years	Replacement Score : 4.07
Equipment Type : Power	Equipment Class : Transmission	LTC : No	Oil Preservation System : Atmosseal
Max Rated Power : 500 MVA	Description : 5 BANK (PH 1) PH 1 PH 1	Application Type : Autotransformer	Comments : Add Comment
		Manufacturer : ASEA-Brown Boveri	Hyperlinks : Add Hyperlink


General | Dissolved Gases | Duval Triangles | Bushing | Partial Discharge | Standard Oil Test | GIC | LTC DGA | Health Score Trend | Compare to Family | Message Log

Health Score



Health Score: **1.08** Health Score Source: **DTMP**

Importance over Health Score



Health Score: **1.08** Health Score Source: **DTMP**

Message Summary

Date	Problem	Recommended Action	Time Frame	Details
06/21/2017	Diagnosis not applicable	Solution not applicable	As soon as possible	Details
06/21/2017	Dissolved gas analysis issue detected	Further testing of the transformer is recommended.	As soon as possible	Details
06/21/2017	Oil quality issue detected	Some repair of the transformer is recommended.	As soon as possible	Details

Algorithm List

Algorithm	Last Updated	Alerts	Warnings	Informational	Predictive	Actions	Errors
Online DGA, Moisture (Hydran M2)	Jun 21, 2017 1:20	1	0	0	1	0	3
MTMP	Jun 21, 2017 1:20	0	0	4	0	0	1
GIC	Jun 21, 2017 1:20	0	0	0	0	0	1
Expert System	Jun 21, 2017 1:20	3	0	1	0	3	0
Online DGA, Moisture (Transfix)	Jun 21, 2017 1:20	0	0	3	1	0	1
Thermal Profile	Jun 21, 2017 1:20	0	0	0	0	0	1

105%

Success stories:

4. Success Stories

The business case for the Asset Health Center was based on three main areas: Failure Prevention & Safety, Maintenance Optimization, and Prioritizing Asset Renewal. The benefits achieved at this point have exceeded the original business case model in the last 3 years.

Important Challenge:

Another challenge was creating support for the asset health solution project across the organizations. The software product was new to the Utility and our engineering teams. The engineering organizations were not convinced of the benefit possibilities. Also, monitoring devices had been tried at various times in the past with little success. Field resources were very apprehensive to support the monitoring initiative. To combat this challenge, the utility created a dedicated project team to support the asset health solution project. The dedicated team worked across organizations on communication, benefit confirmation, funding approvals, change management, process integration, organizational training, and technical assistance. The project would not have been successful without a team of dedicated change agents.

Dziękuję
(Thank you)!