Advanced Analysis of Nuclear Waste Storage Health

Connects Technology To Business…

Improving Reliability Through Health Monitoring and Predictive Maintenance

Our specific research areas include:

• **Corrosion Modeling** – there are a host of issues that cause corrosion to be the main actor of the degradation of canisters

• **Probabilistic Data-Analytics** – lack-of data will not stop development of the modeling, moreover shortage of inspection data also will not be an issue.

• **Reverse Simulation** – Verification of data derived from the digital-twin can help the reverse-simulation to inference the underlying parameters of importance from inspection data

• **NDE image data-fusion**

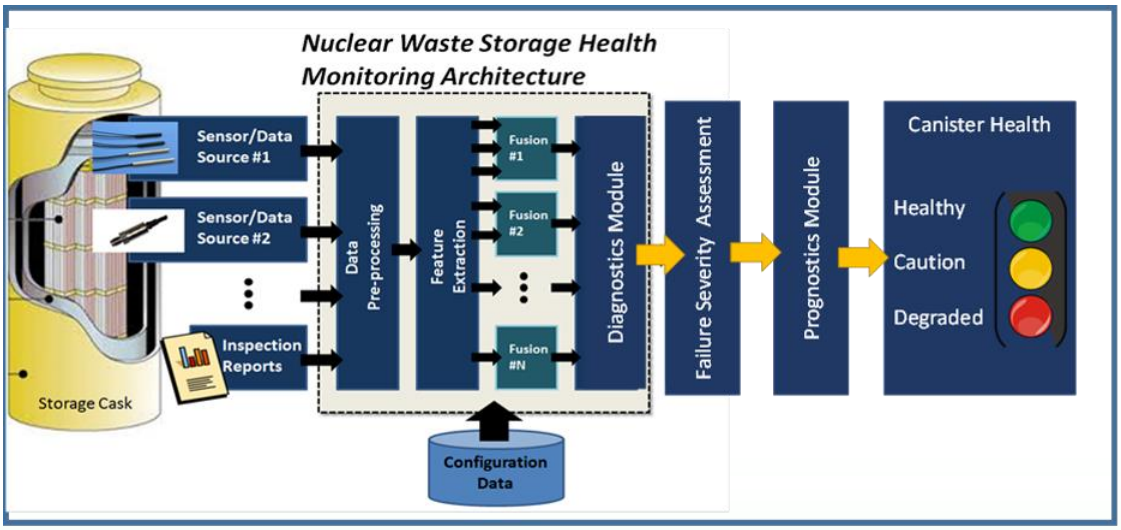
• **Multi-attributes Risk Management**

What can Advanced Analysis of Nuclear Waste Storage Health do?

- **Detect and identify dry storage system failures**
- **Predict remaining useful life of dry storage systems.**

Which technologies does Advanced Analysis of Nuclear Waste Storage Health use?

•Intelligent algorithms to perform data fusion at the feature and sensor levels of abstraction such that classification accuracy is maximized and processing time minimized.

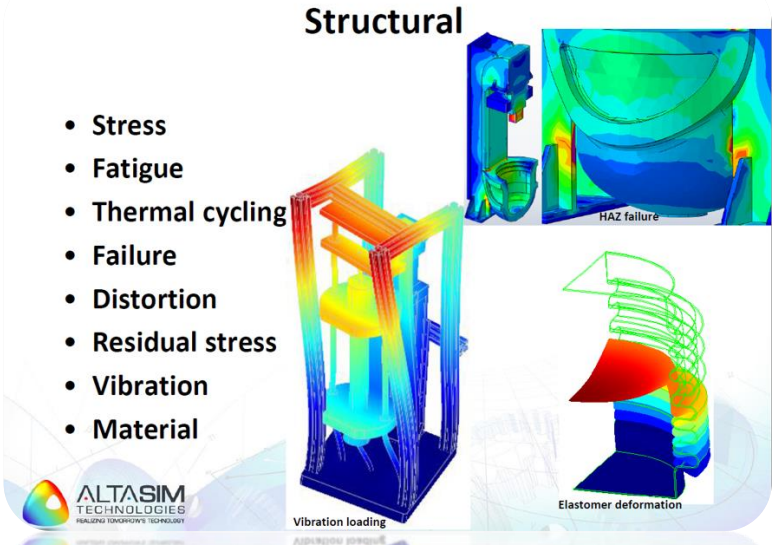


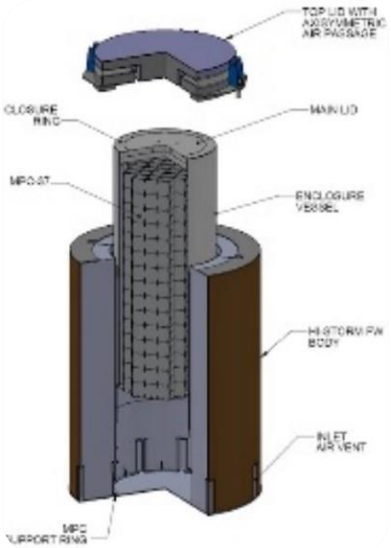
Canister Health Status Conceptual Dashboard

Intelligent System Development and Integration

DETECT!

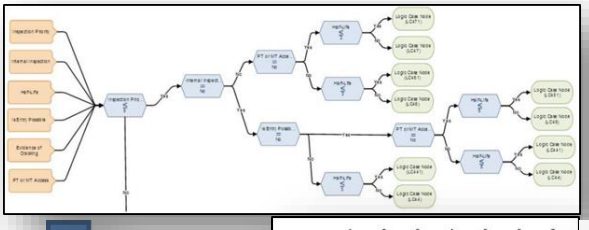
Cracks could be observed in structure automatically if sensors are embedded in the casks/canister structure such as ultrasonic guided wave propagation, fiber optics, strain gauges, etc. Fuel rod cladding cracks could be detected by the release of fission gases inside canister.



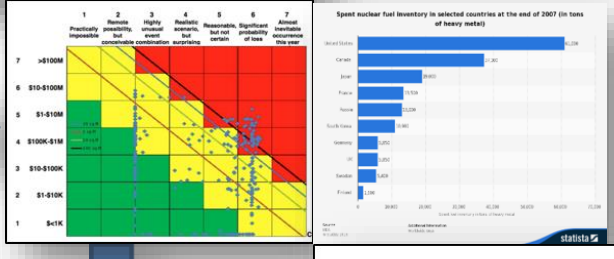


PREDICT!

Direct- Use ultrasonic, fiber optic, etc. data to determine a crack size measure (i.e. virtual sensor), Trend crack growth.

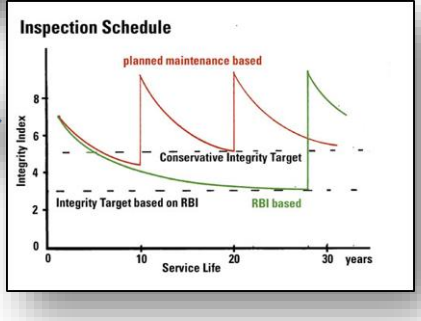


Indirect- Assume very small cracks exist or evaluate current status of cask and canister.



Monitor environments in cask and canister using temperature, humidity, chemical, etc. sensors.

Risk-Based Inspection Planning



Model relationships between environmental conditions and crack rate of growth.

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