

LEGAL & LIABILITY ISSUES WHEN USING PHM

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LIABILITY – RESPONSIBILITY – DUTY

Who is our customer?

To whom do we owe a duty?



THE POWER OF PHM

- Warn of failures early
- Guide warranty policy
- Optimize qualification tests
- Forecast maintenance needs
- Improve designs

WHETHER OR NOT TO USE PHM – IS IT AN OPTION?

Customer Expectations

Legal Issues

COULD WE BUILD A CAR WITHOUT . . .

An oil temperature sensor?

A fuel gauge?

A tire pressure alert?

A collision alert system?

Other safety sensors?

CONSIDER . . .

An jet aircraft without turbine vibration sensors?



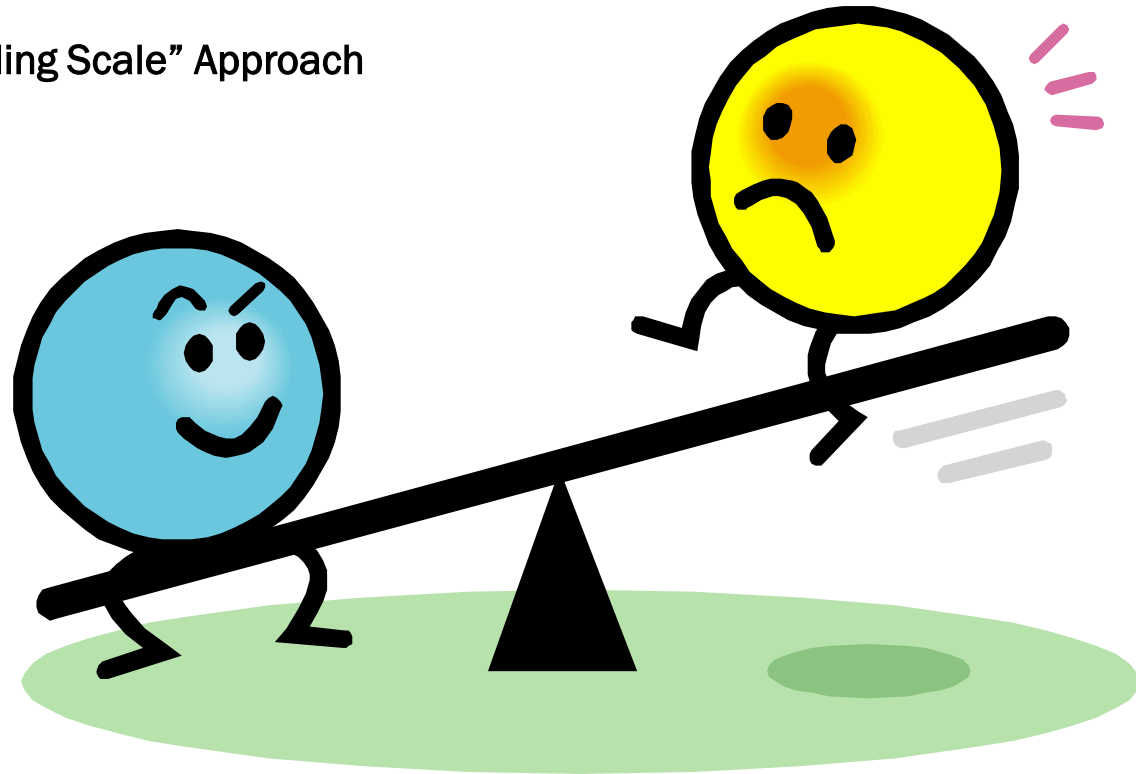
OR, CONSIDER . . .

A Li-ion battery
charging system
without a heat sensor?



COST – BENEFIT – SAFETY - LIABILITY

A “Sliding Scale” Approach



UNDERSTANDING “LIABILITY”

LIABILITY

=

责任

“LIABILITY” – WHAT DO WE MEAN?

RESPONSIBILITY FOR REMEDY OR HARM

Lost Money

- Warranty & Contract Claims
- Consumer & Regulatory Claims

Lost Reputation {In the Marketplace ~ In the Workplace}

Lost Market Share ~ Lost Employment ~ Lost Freedom?

INADEQUATE PHM IS COSTLY

UNRELIABLE PRODUCTS / SYSTEMS EXPOSE SELLER TO LIABILITY

- A Warranty Creates Liability
- A Sales Contract or Agreement Creates Liability
- Regulations, Codes and Statutes Create Liability
- Criminal Liability

DELAYED DISCOVERY OF PROBLEM EXPANDS LIABILITY

**PHM ENABLES EARLY DETECTION AND CORRECTION
OF RELIABILITY AND SAFETY ISSUES**

“LIABILITY” – BROADER MEANING

CONSEQUENCES OF POOR RELIABILITY

Infrastructure

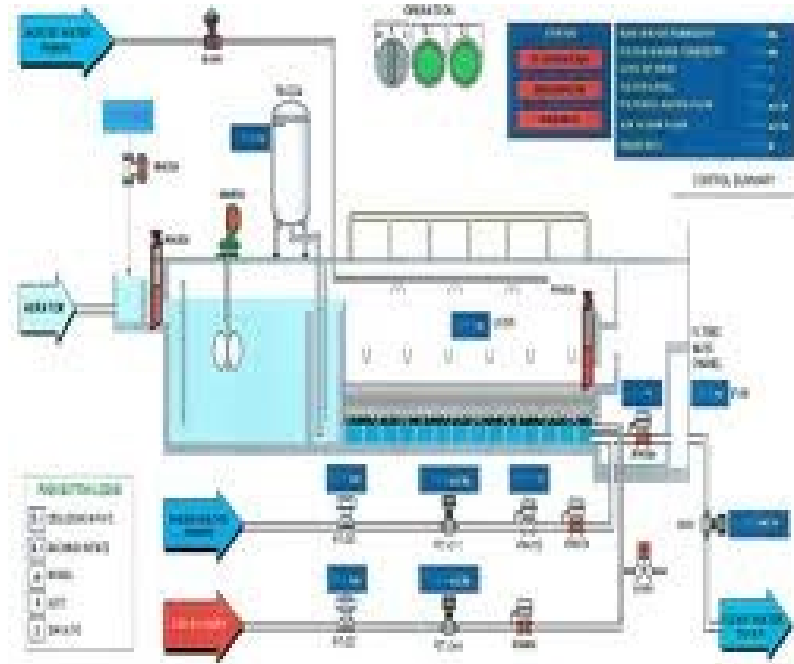
- Power Generation, Water Treatment, Mass Transit

Loss of Life, Health & Social Stability

WASHINGTON DC RAIL CRASH: 2010



WASTE WATER TREATMENT PLANT



BRITISH PETROLEUM - GULF OF MEXICO



SPACE SHUTTLE CHALLENGER EXPLOSION



DOES PHM ELIMINATE THE RISK OF LIABILITY?

No.

If PHM is to be utilized in a product or system,
then it must be employed with skill.

NEGLIGENCE LIABILITY (玩忽职守的责任)

- (1) A Duty or Obligation is Owed;
- (2) The Duty or Trust is Breached / Broken;
- (3) Harm Results from the Breach of Trust; and
- (4) The Person Breaching the Trust is Responsible for the Harm that is Caused.

DATA COLLECTION

What conditions should be monitored?

What monitoring methods should be used?

DATA ANALYSIS

What analytical method is best?

- Model-based
- Data driven
- Fusion approach

Should we use the same models and analysis throughout the life of the product or system?

OUT-OF-DATE TOOLS & ANALYSIS

Failure to evolve leads to liability.

What worked yesterday may not work well today.

Negligence to ignore current best practices.

WHAT IF PHM FAILS TO PREDICT / PREVENT A FAILURE AND HARM RESULTS?

- I want to see the raw data.
- I will ask PHM experts to analyze the data.
- I will ask whether there was some model or algorithm that might have predicted and prevented the harm.
 - If there is / are analytical tools that could have detected the problem, then I will blame those responsible for the use of stale PHM data collection or analysis for the resulting harm.

CONCLUSIONS

- PHM technology is constantly evolving.
- What worked yesterday may not be suitable today.
- Customers expect best PHM practices to be used.
- Failure to stay current with new PHM methods is negligent and creates liability.

CONCLUSIONS

**This is why we are all here –
To learn from one another so that:**

- **Our practices meet current best practices, and**
 - **We reduce the risk of liability.**

CONCLUSIONS

Thank You

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Welcome to IEEE PHM