



How is Reliability Engineering Changing?

Fred Schenkelberg

Risk Management



Proactive



A crystal ball sits on a wooden pier, reflecting the sunset and the lake. The background is a blurred landscape with a body of water and trees under a cloudy sky.

Enabling Tech

Do you still use

MTBF?

Reliability History



Just works



Definition



Discipline

It should just work



Not long ago you would
personally know the
craftsman

Crafts

Local

Competition

One Hoss Shay

Reliability Definition



how is this different then
common use?

“The probability that an item will perform a required function without failure under stated conditons for a stated period of time.”

O'Connor and Kleyner in Practical Reliability Engineering 5th ed.

Tools and Techniques



FMEA
HALT
ALT
RCA
RBD

...

So many TLAs and FLAs

What is the latest
innovation

in reliability that you
use today?

Industry Trends



Customers

Consequences

Supply Chain

Customers Demand More



I heard this 30 years ago:
Faster, cheaper, better

This hasn't changed, yet
continues

Failure are more Expensive



The Yelp effect

The costs associated with warranty may be a tracked number.

Lost sales will cost more

Supply Chain Complexity



Gone are the early days of Ford Motor's early days

Cost is not the only factor to consider

How deep into the supply chain do you go?

What trends

are you seeing?

Recent Changes in



Education



Sensors



Data Analysis

Changes in Education



What is more important: the school attended or the results you create?

Massive open online courses

Top universities

Certifications

Google it

Changes in Sensors



Just what we need: more data, right?

Cheaper

Easier to use

Models and relationships

Changes in Data Analysis



When was the last time you spent a day analyzing data?

More data doesn't mean better

Emphasis still not on what to collect and why

Tools slow to move off MTBF option

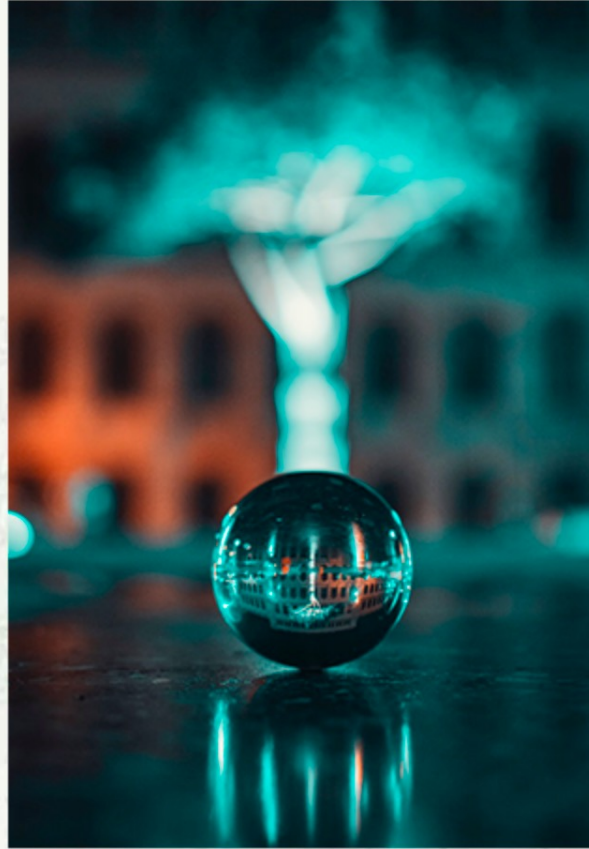
What are the
changes

you are seeing?

Future Trends & Barriers



PHM



PoF



Risk Mgmt

Prognostic Health Management



Do make the best use of this idea?

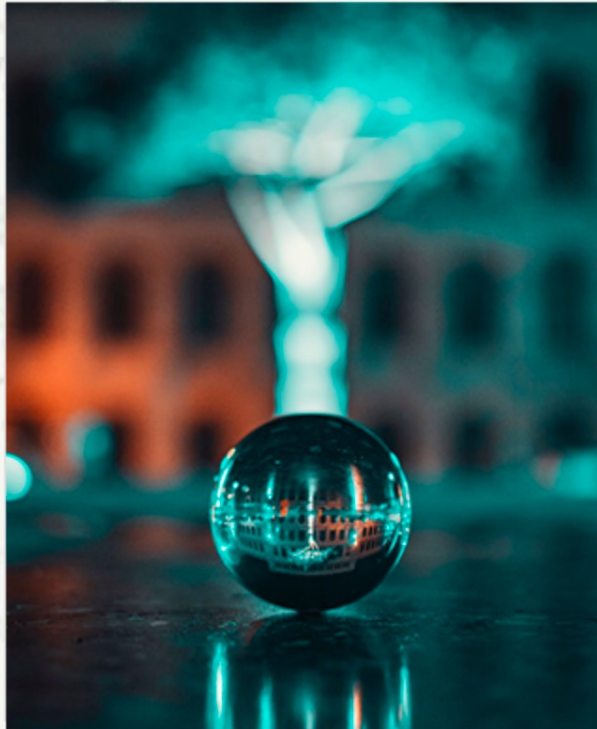
Trend

better sensor and models
benefits becoming recognized

Barriers

need to build models and understanding
doesn't apply to all failure mechanisms

Physics of Failure



When do you accept a model for use?

Trend

Helps with DFR efforts
More models becoming available

Barriers

Significant effort to create models
New materials, etc every day (it seems)

Risk Management



We're getting deeper into
business management with
this

Trend

Increasing emphasis across industries
Risk is more than product failure risk

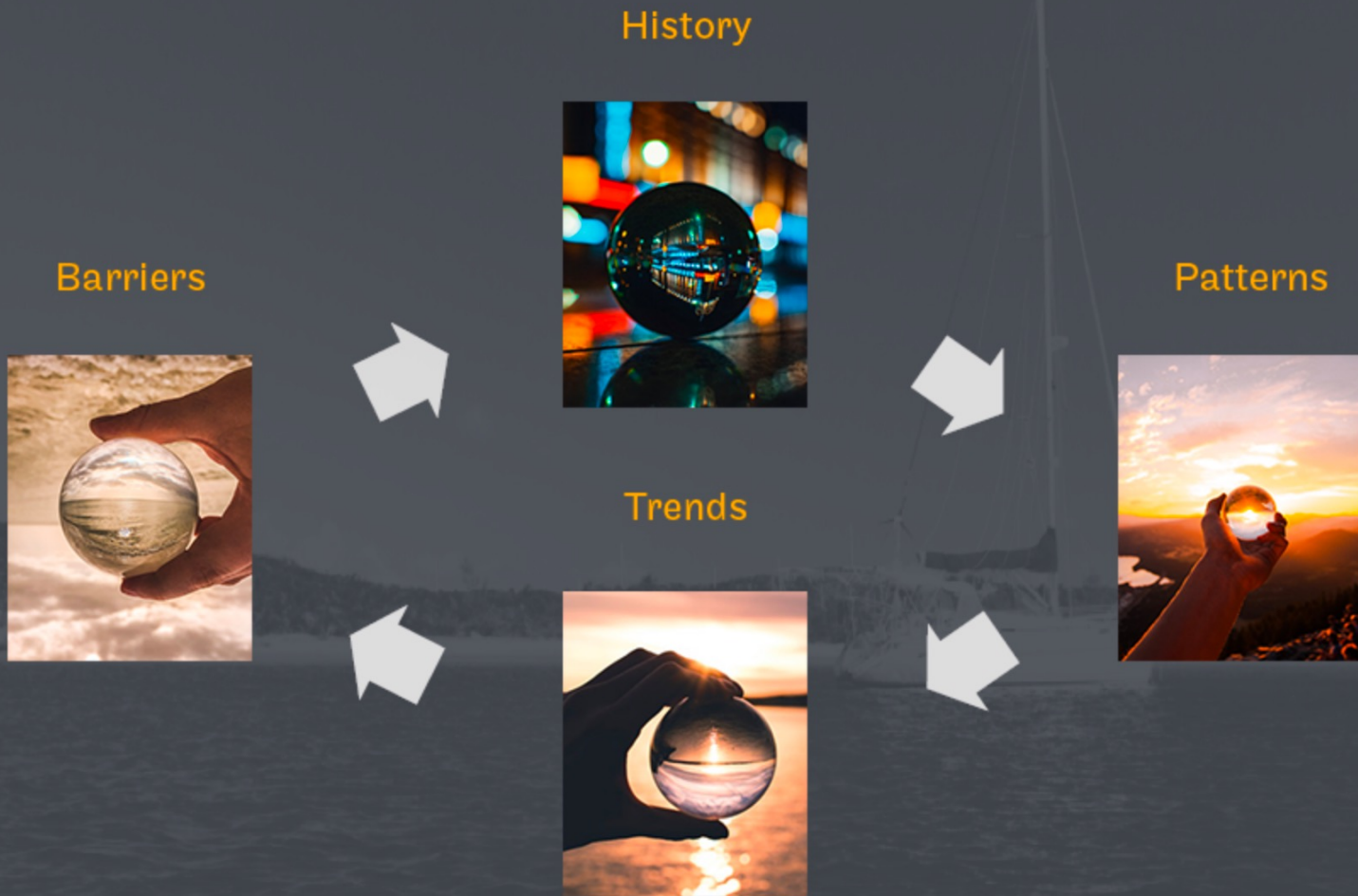
Barriers

Shift in mindset of reliability engineers
Practices still under development

What do you see

in the future of
reliability?

In Summary



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