Covered Conductor

- Dimensions
- Benefit

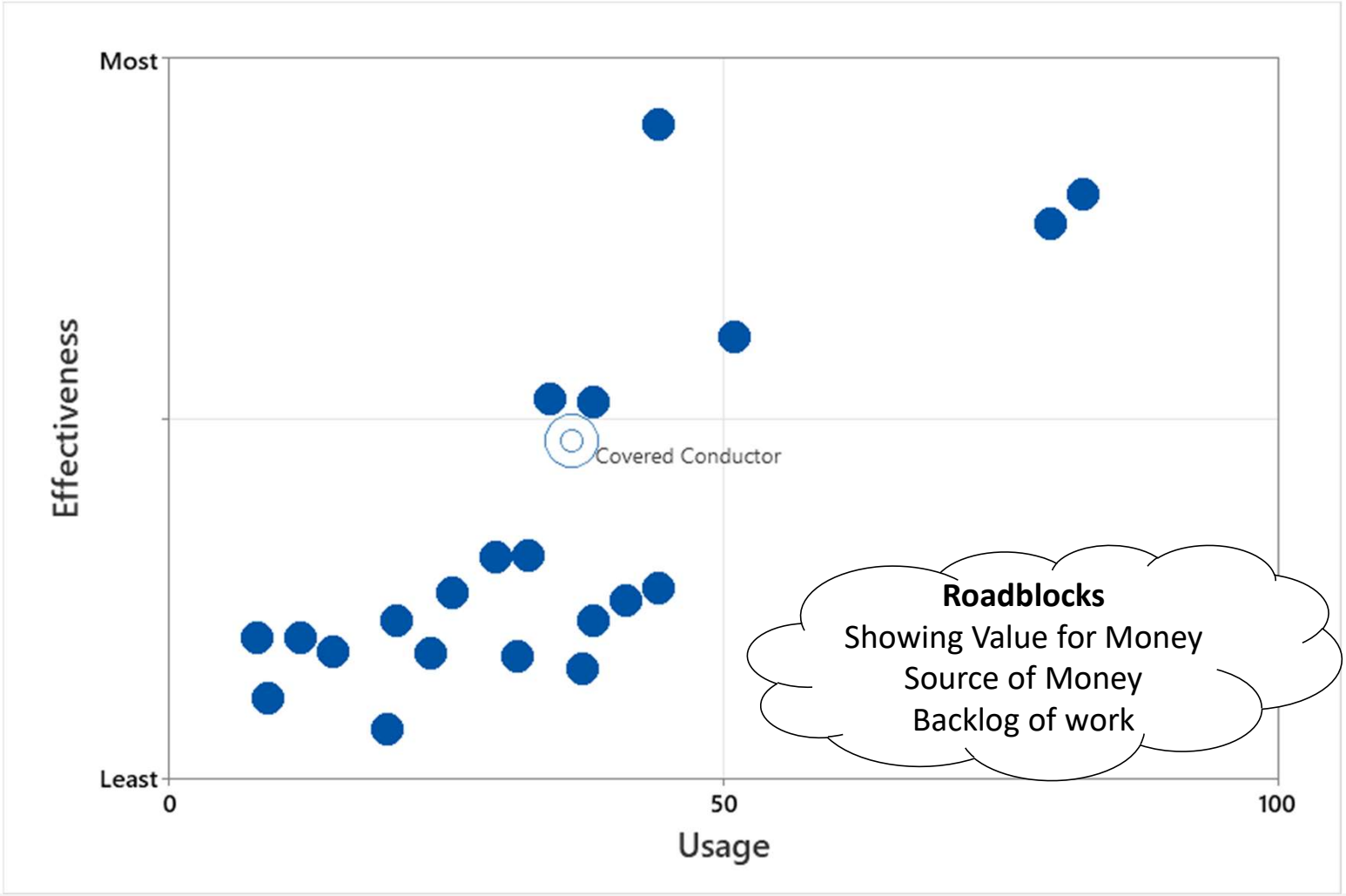
Spring 2026 ICC

N. Hampton
J. Perkel

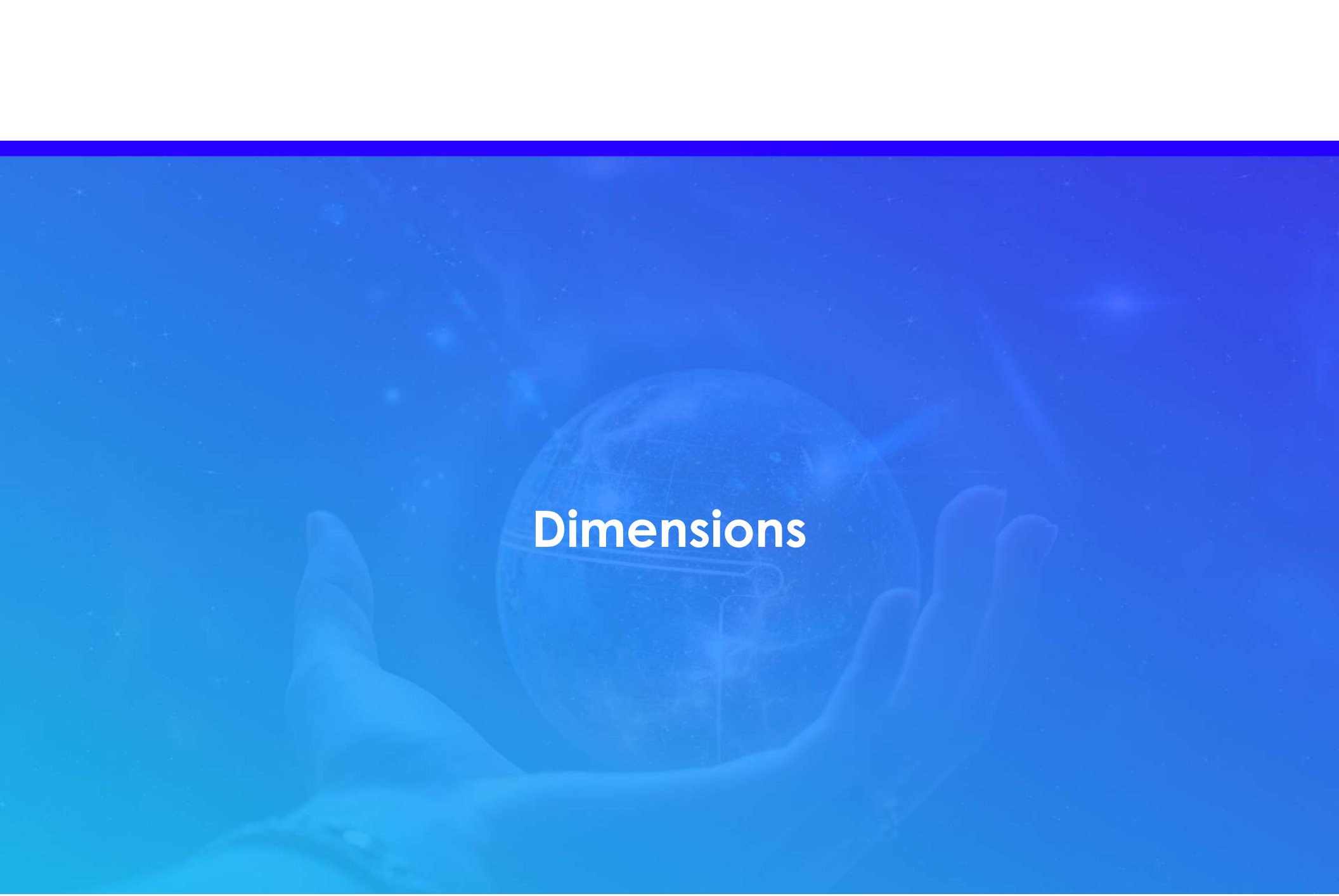
Resiliency 2025

- **Reliability** metrics show long term improvement ☺

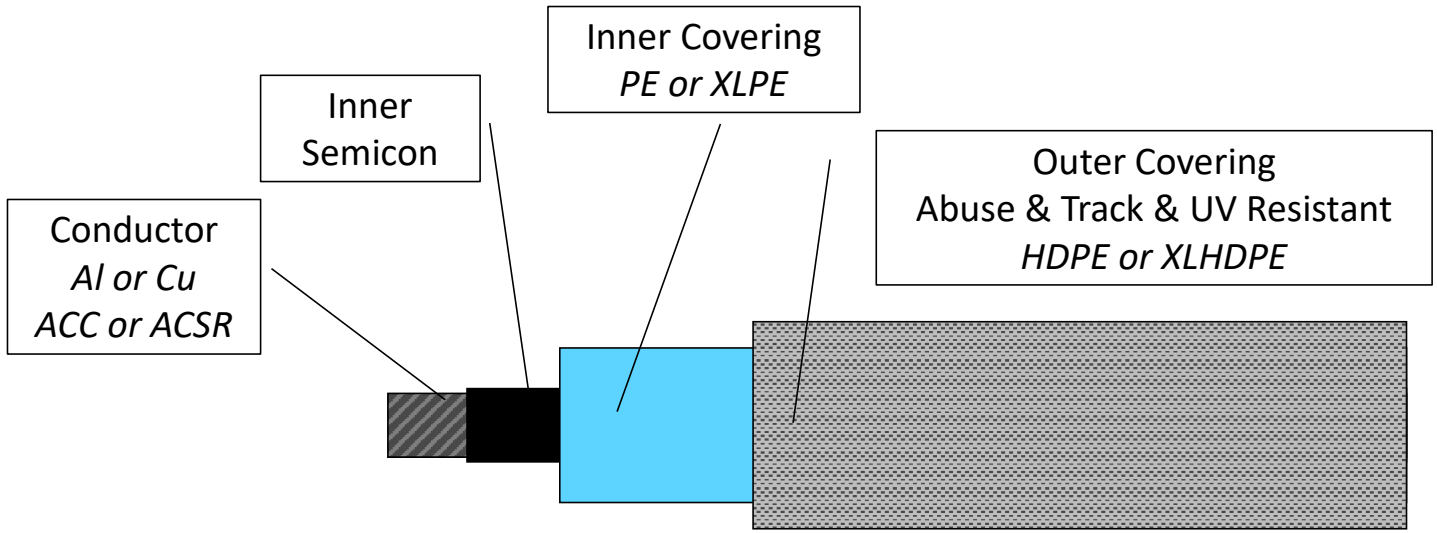
- **Resiliency** indictors show a long term degradation ☹

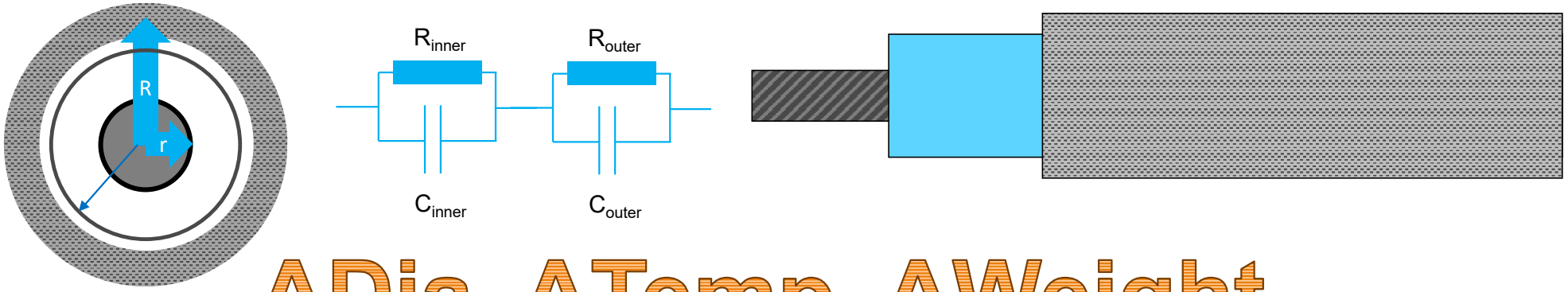


Dimensions

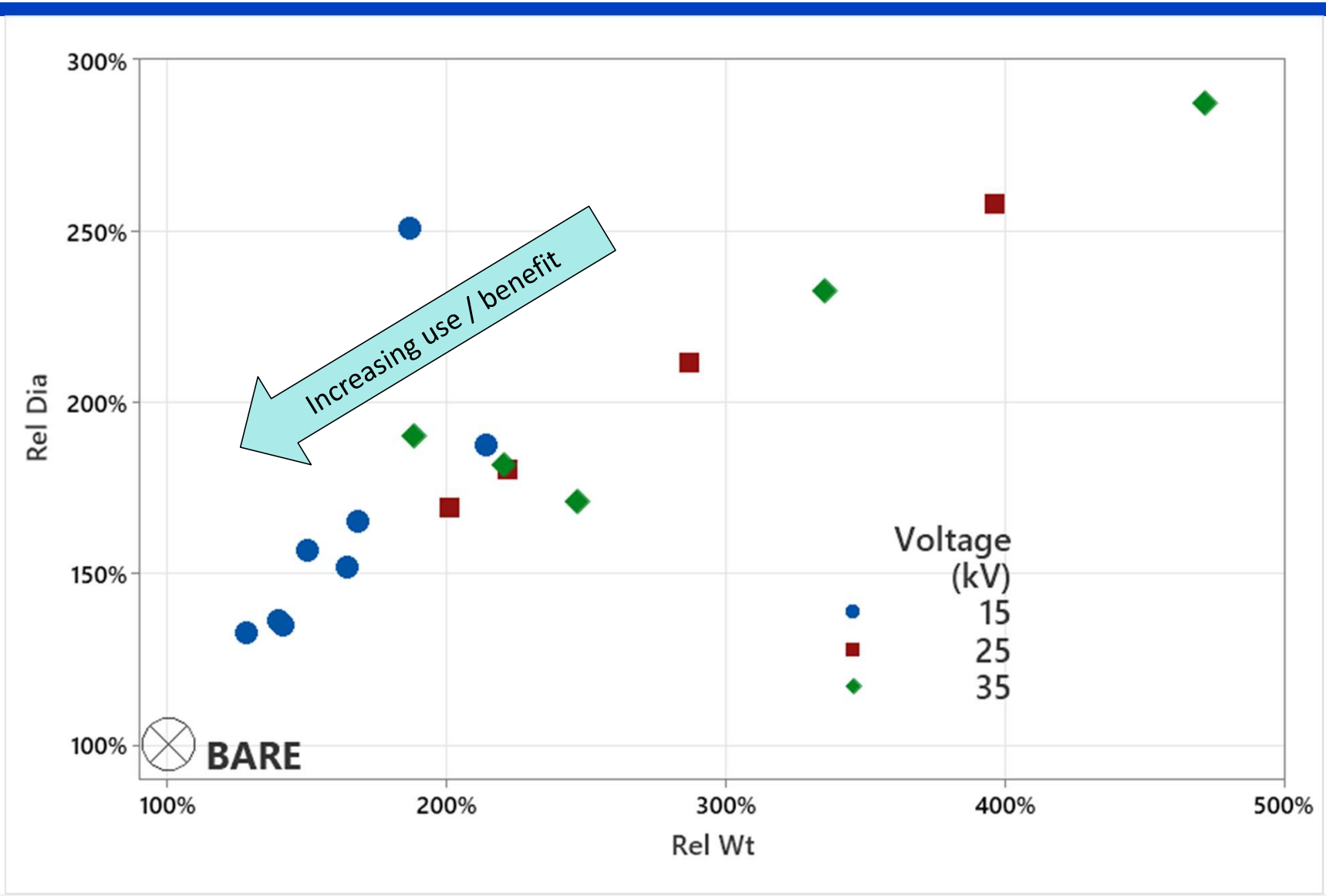


Background – Covered Conductor

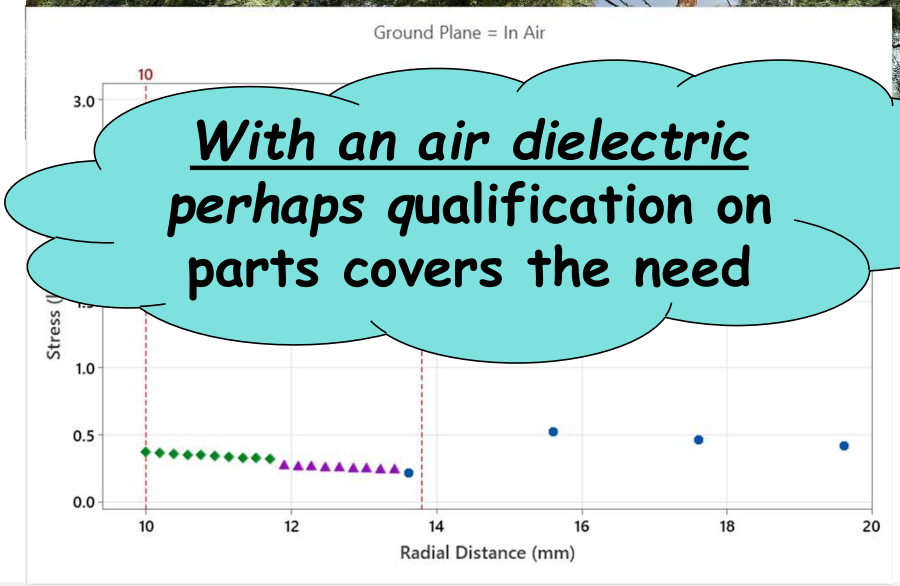




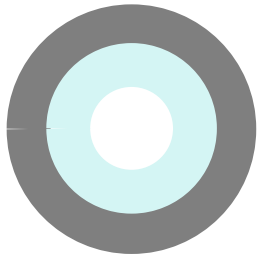
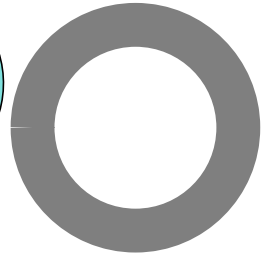
ΔDia, ΔTemp, ΔWeight


300%
250%
200%
150%
100%
Rel Dia
Increasing use / benefit
Voltage
(kV)
15
25
35
BARE
100%
200%
300%
400%
500%
Rel Wt

Operational modes – air dielectric



Qualification on parts
No tests on whole!!

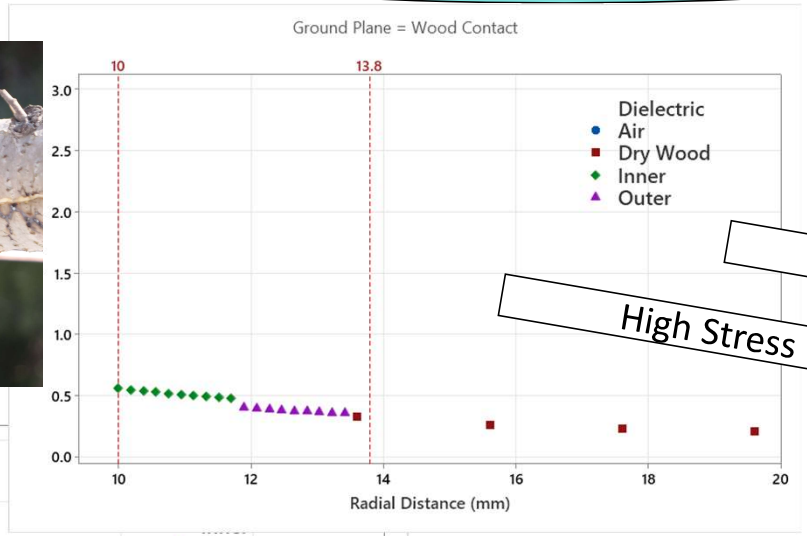
Semicon		Brittleness Test Resistance Stability
Inner Covering (XLPE or PE)		
Covering		Dielectric Constant
		Env Stress Cracking Sunlight Resistance Tracking Resistance

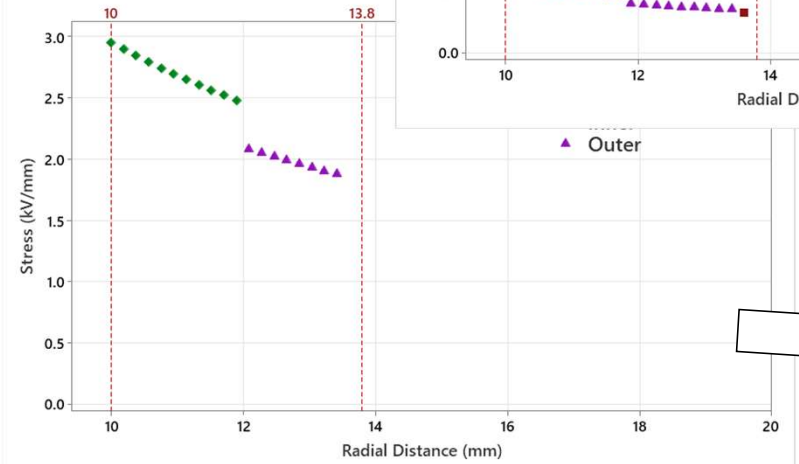
With an air dielectric *perhaps qualification on parts covers the need*

No high voltage
No heating
No current & voltage

Operational modes – covering dielectric

The covering is there for when there is no air dielectric

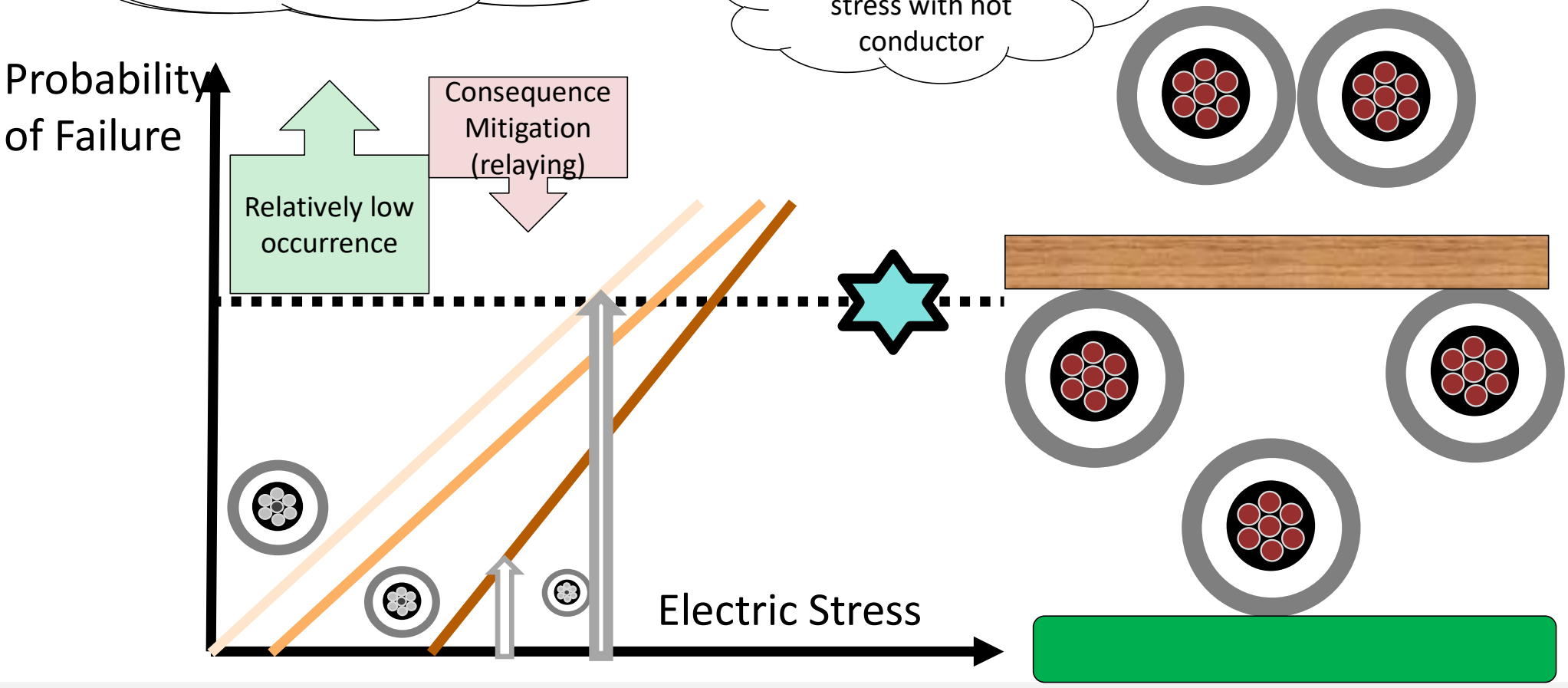




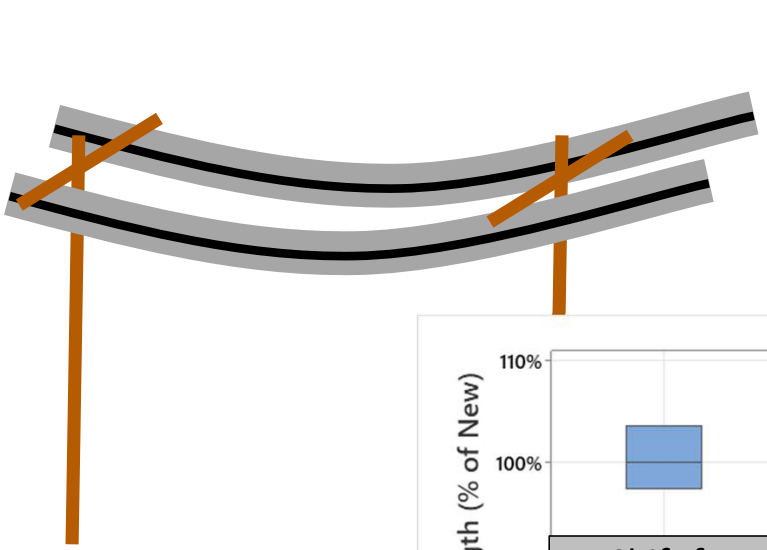
Covering - what should we know to change design

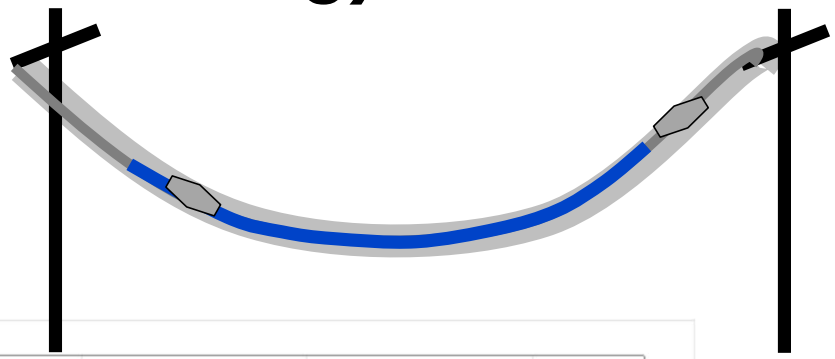
How likely is failure at these high stresses with a hot conductor

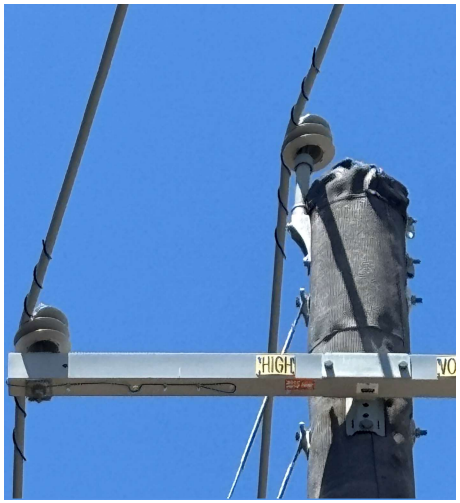
How large is the leakage current high stress with hot conductor

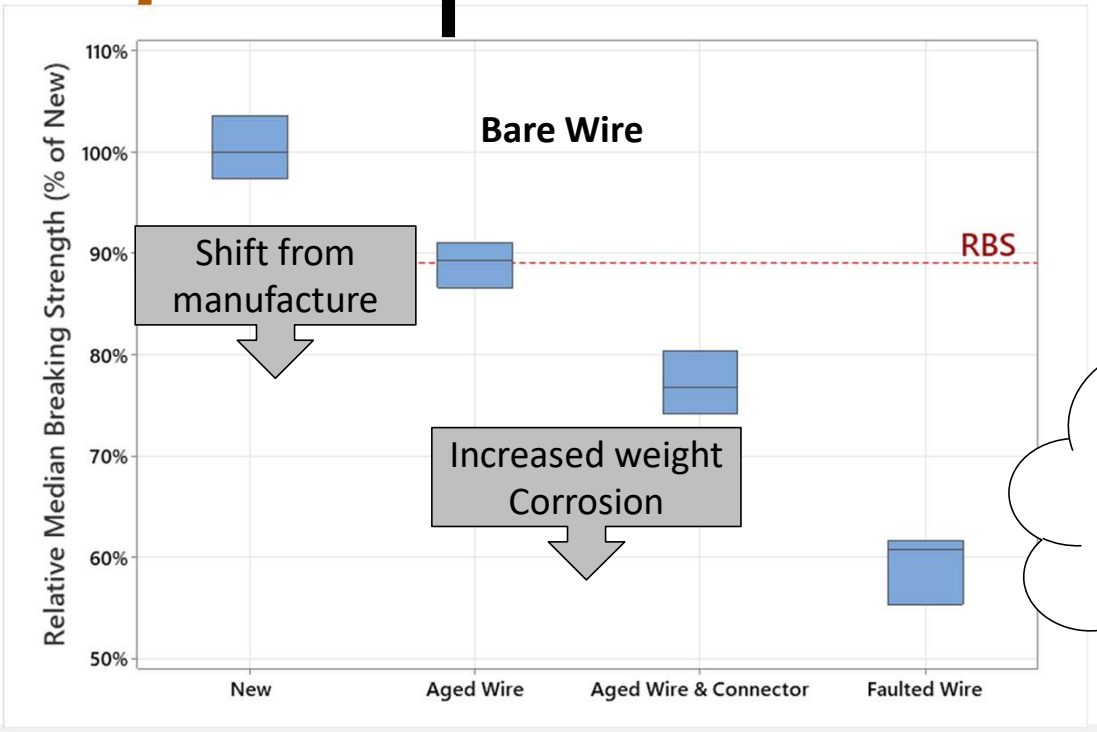


Longevity (conductor / covering) - what do we miss









How does the cover age?
How does the cover interact with the conductor?
How would this change with new dimensions?

Open Research Questions

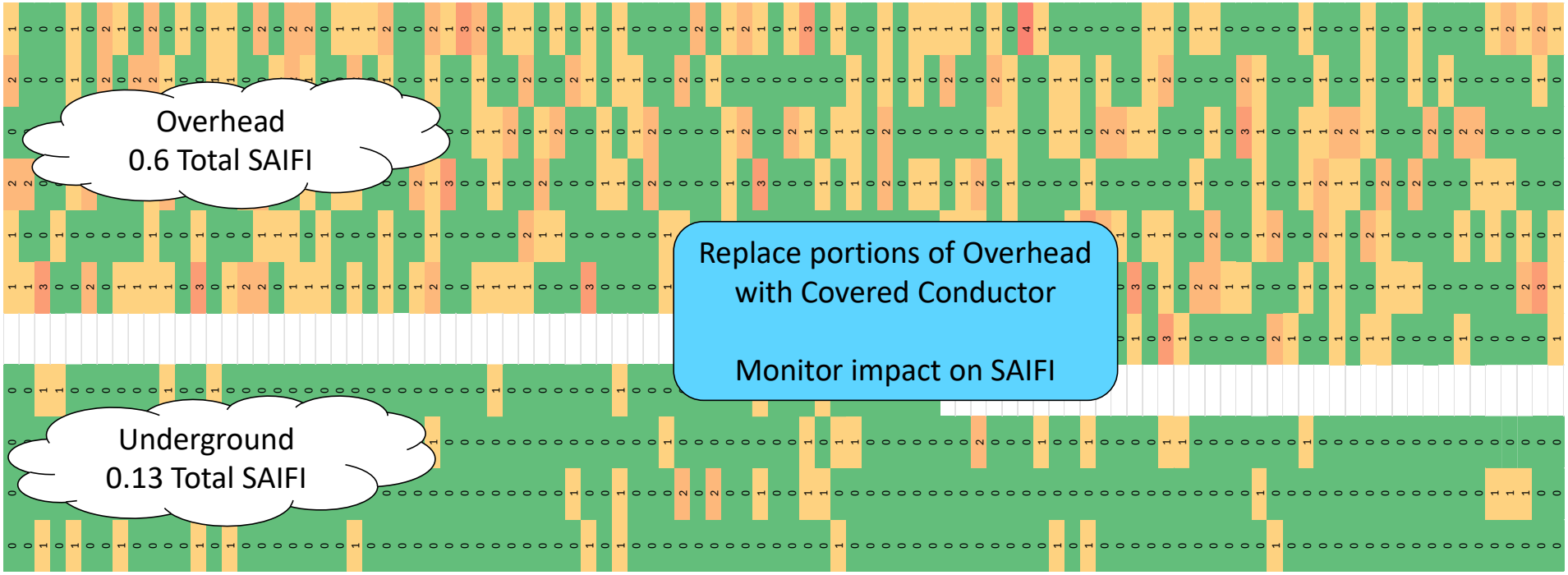
1. We don't have robust information about many of the performance characteristics in the critical applications – qualification based around the assumption of an air dielectric – what should be included in Lab evaluations?
   - Voltage
   - Water
   - Temperature
2. How do covered conductors age?
   - Conductor
   - Covering
3. Connections

Benefit

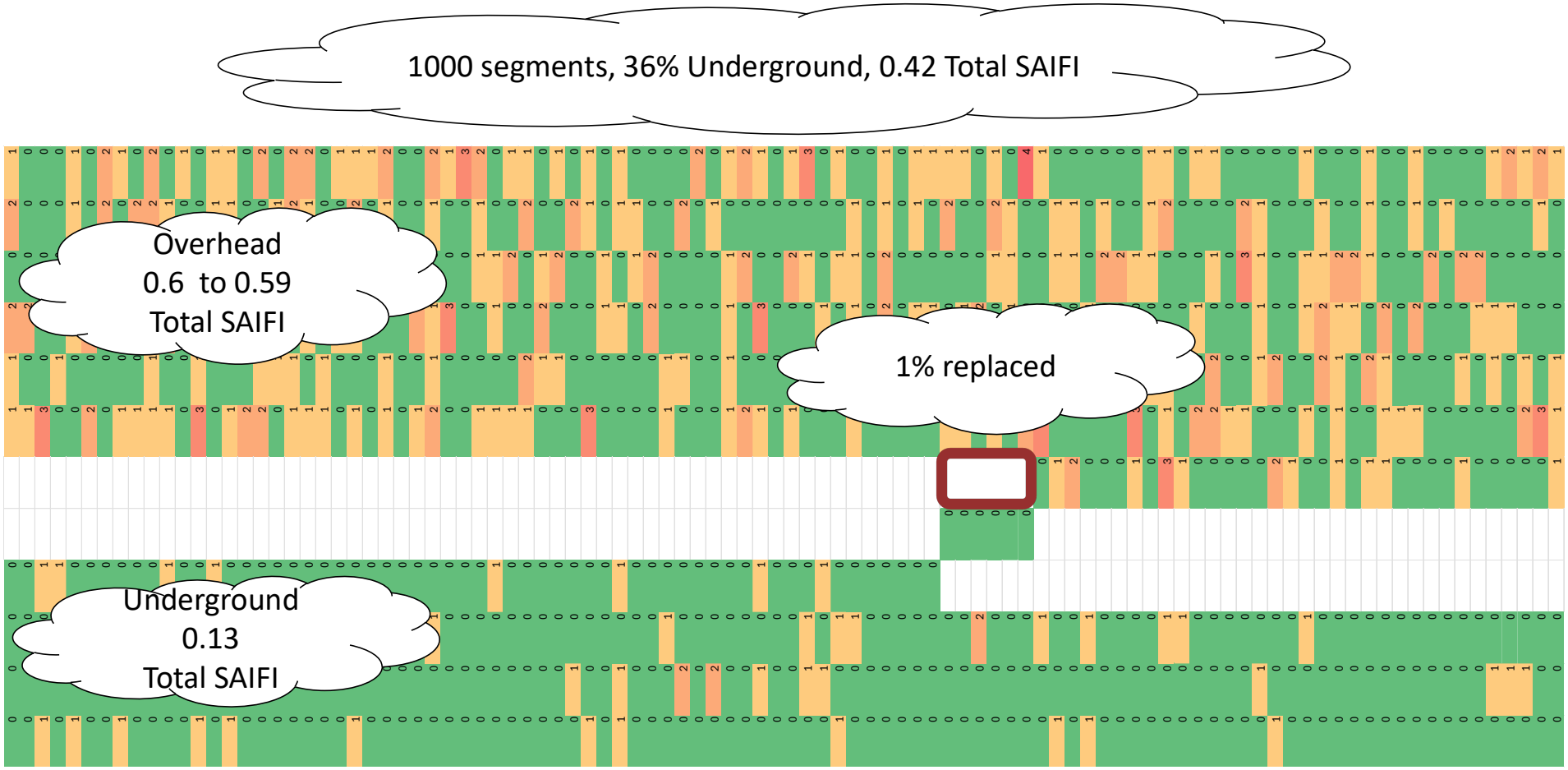
Modeling shows how this might be attempted and what results might look like

Benefit / Cost – contribution to SAIFI model

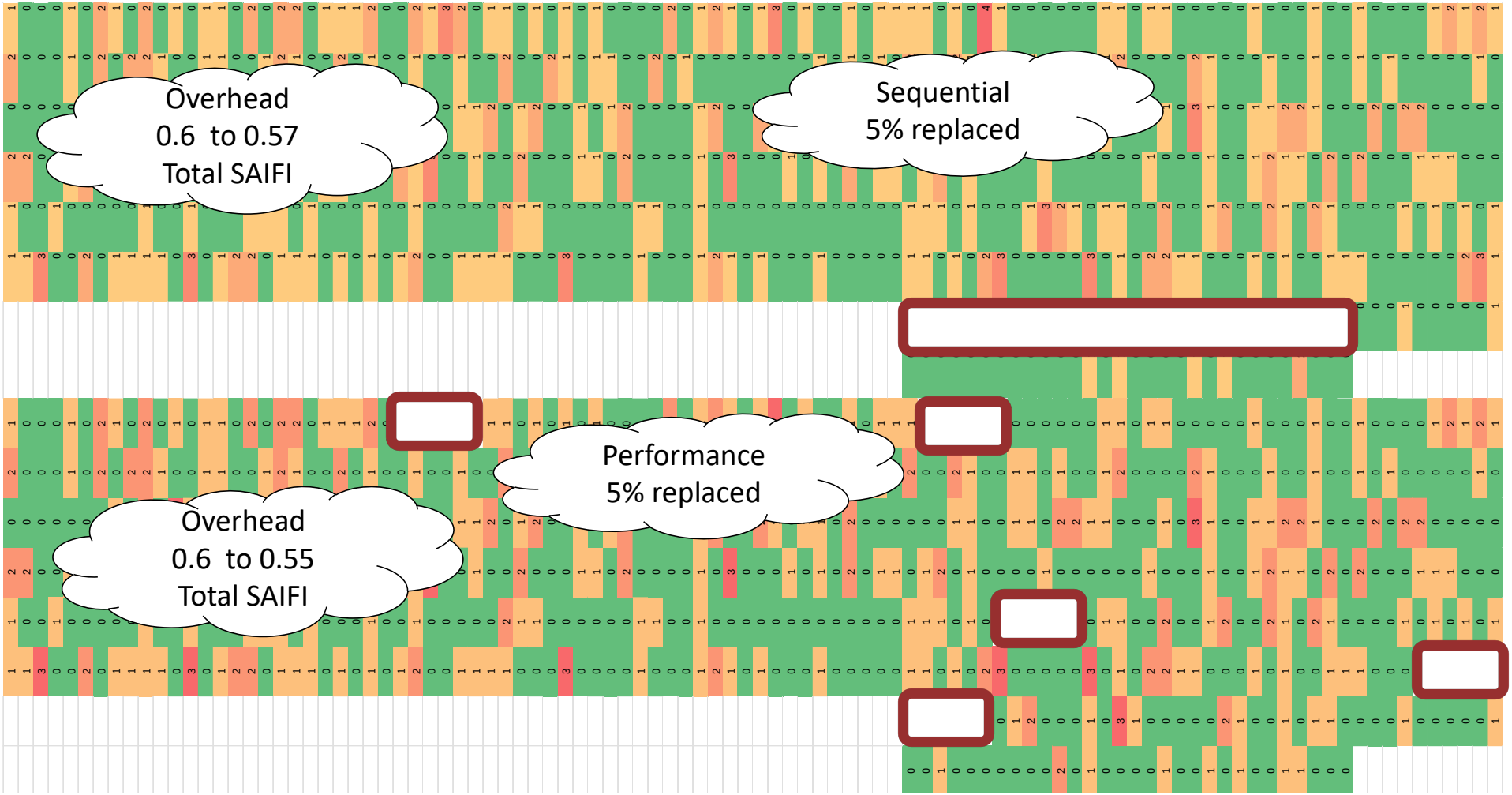
1000 segments, 36% Underground, 0.42 Total SAIFI



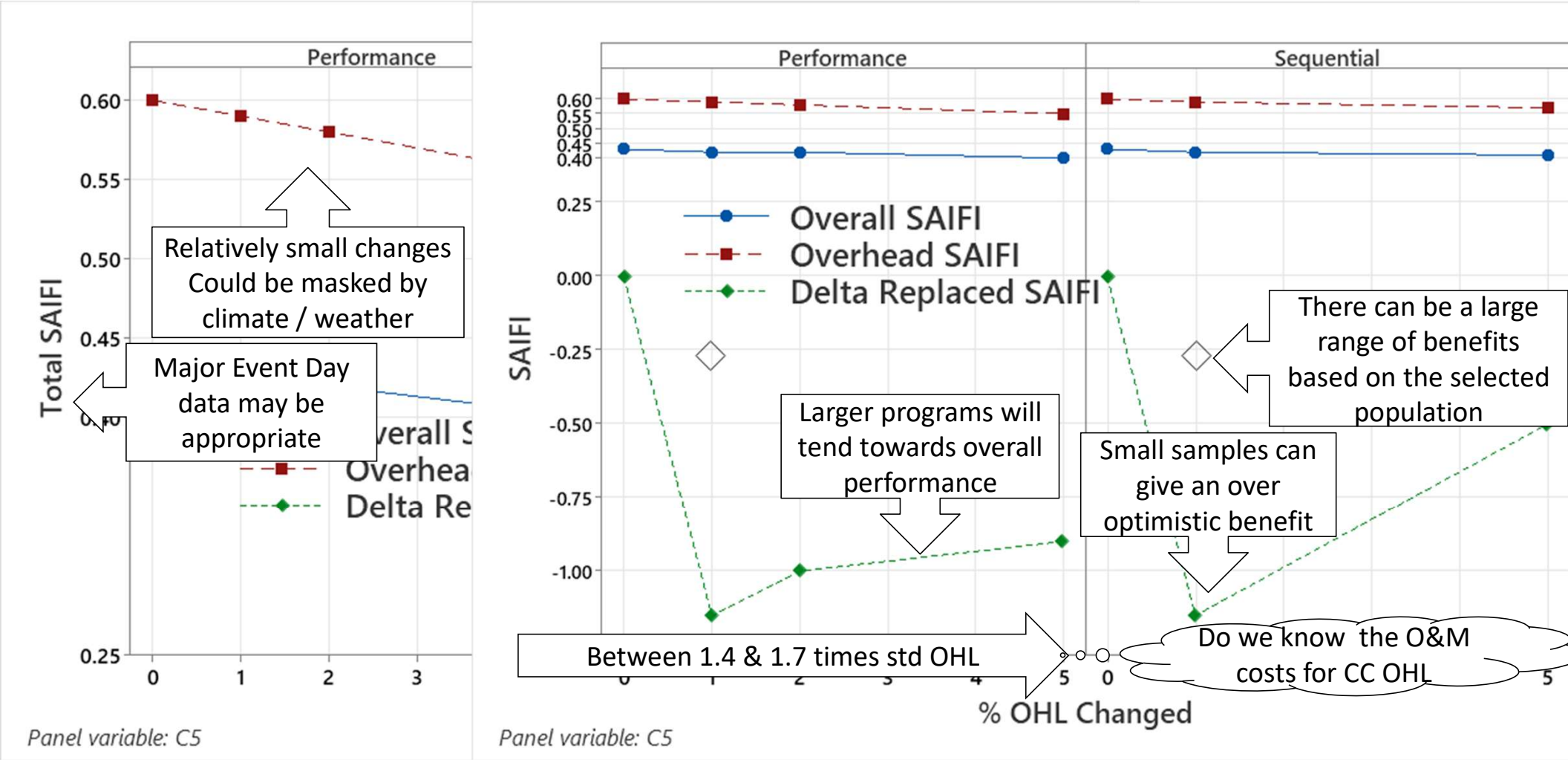
Benefit / Cost



Benefit / Cost



Benefit / Cost



Open Research Questions

1. We don't have robust information about many of the performance characteristics in the critical applications – qualification based around the assumption of an air dielectric – what should be included in Lab evaluations?
   - Voltage
   - Water
   - Temperature
2. How do covered conductors age?
   - Conductor
   - Covering
3. How do we estimate the benefits and ascribe a value to them?
   - Field Performance
   - Metrics
   - Capital cost
   - O&M costs
4. Connections