

# Optimisation of Wind Energy O&M Decision Making Under Uncertainty

## A Heavy Lift Decision Support Tool

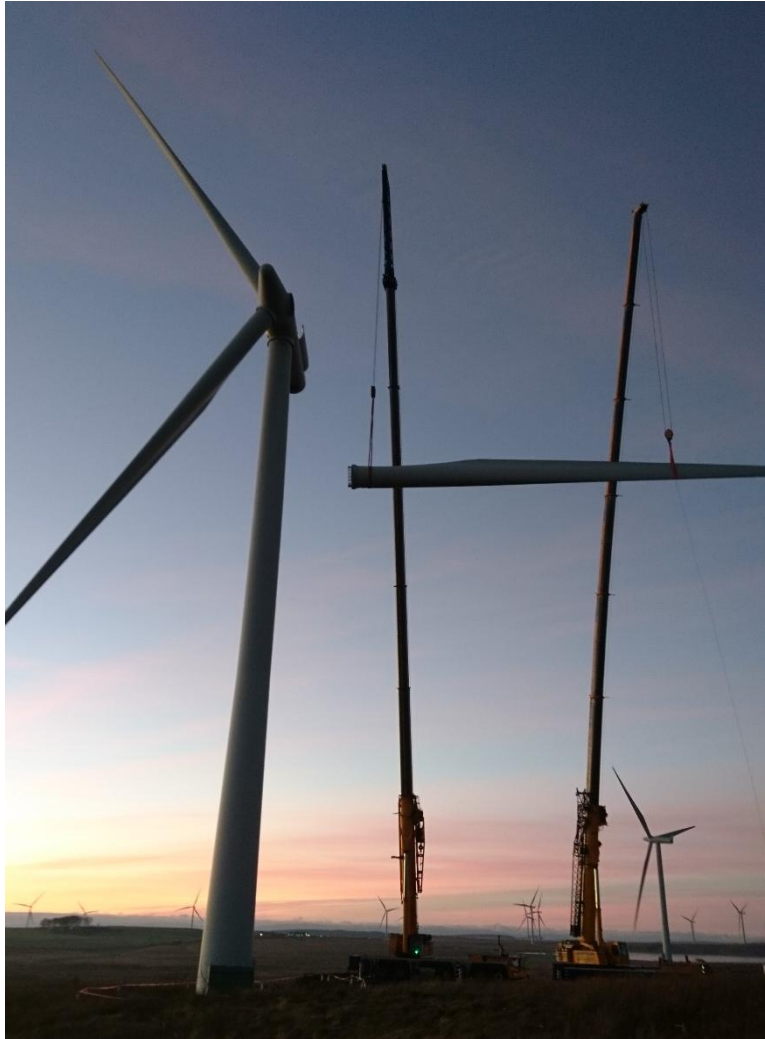


Photo credit: A Clapperton, SPR

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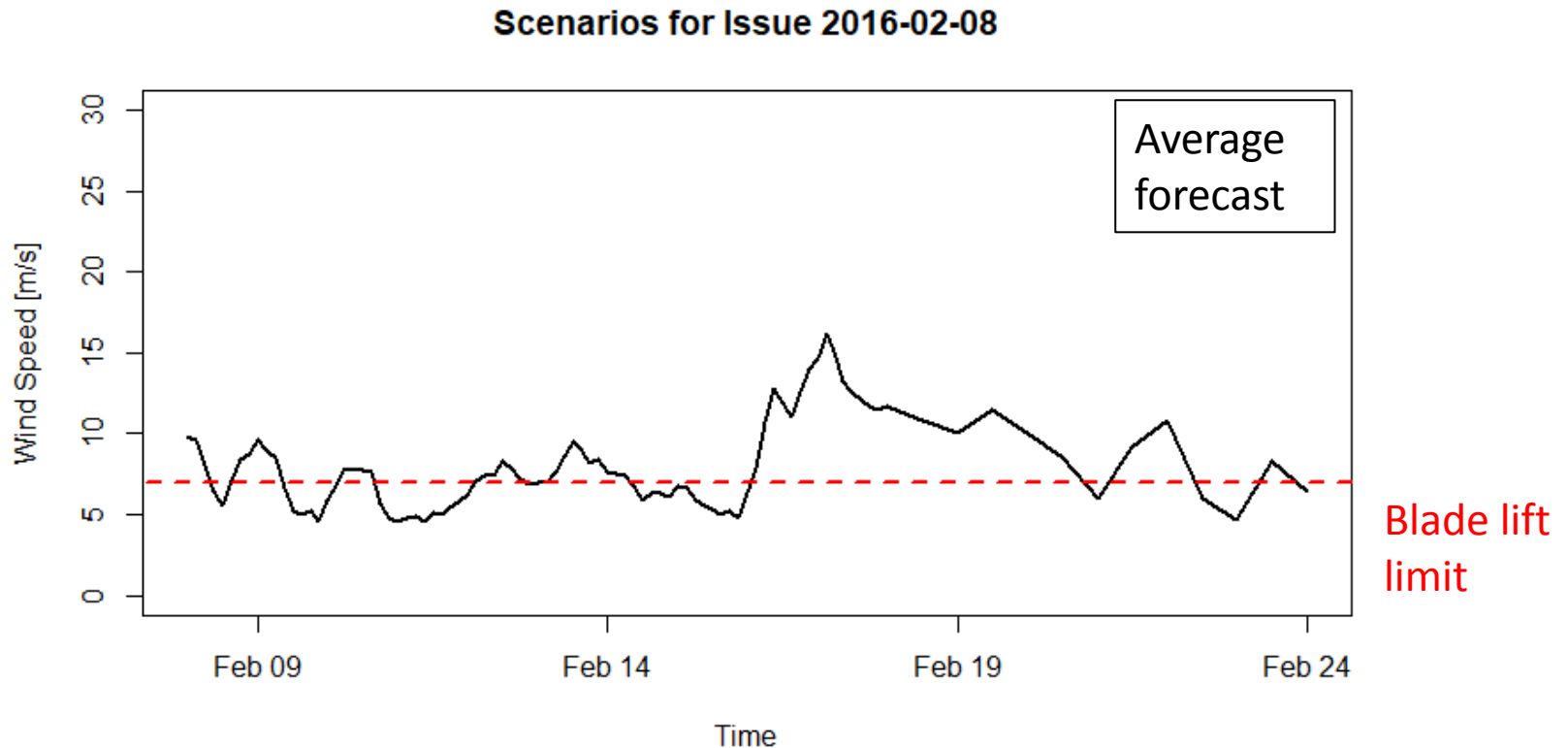
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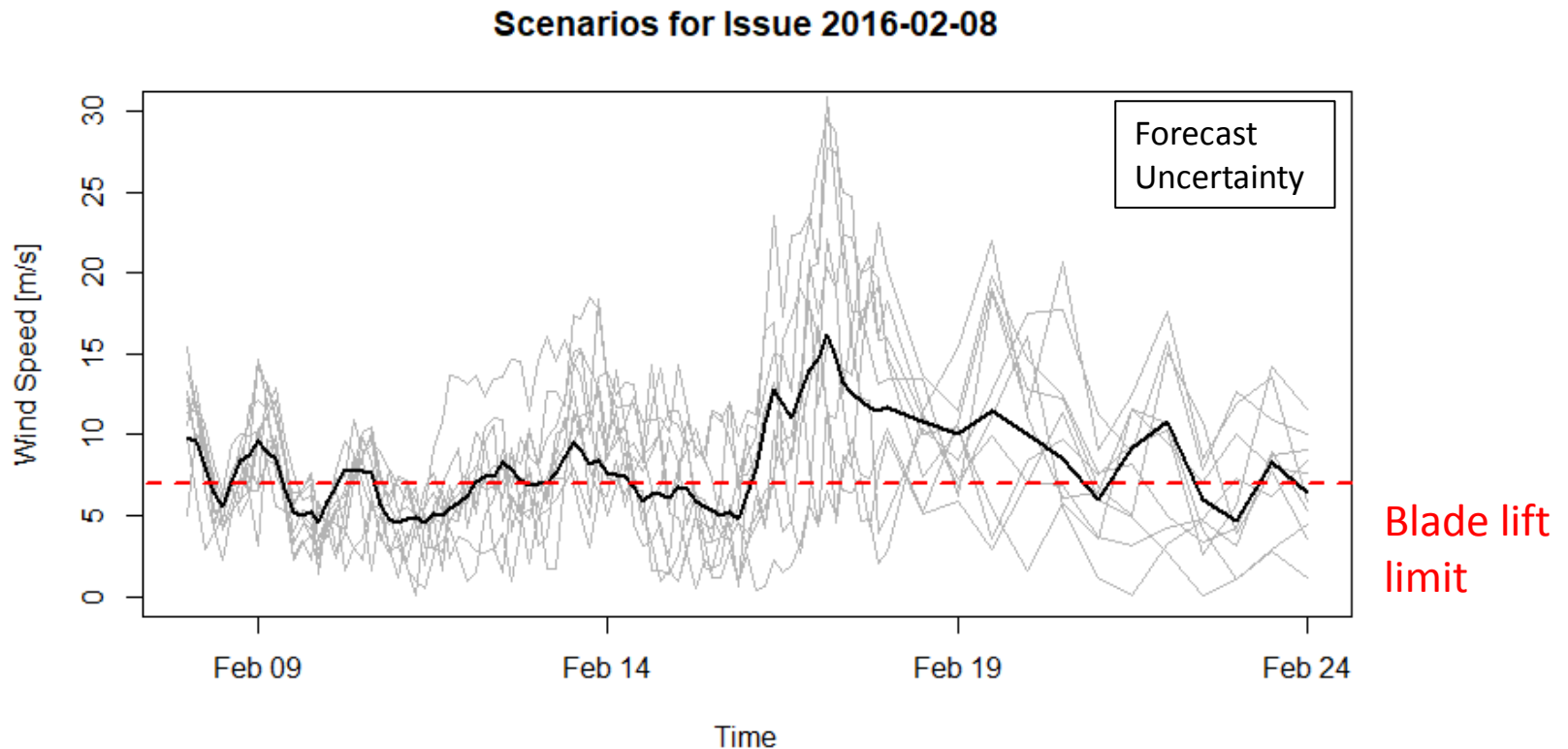
# Lifting a Blade: “Business as Usual”

- Use average weather forecast to make blade lift scheduling decision



# Lifting a Blade: Dealing with Uncertainty

- Can we use our knowledge of forecast errors to make a better decision?



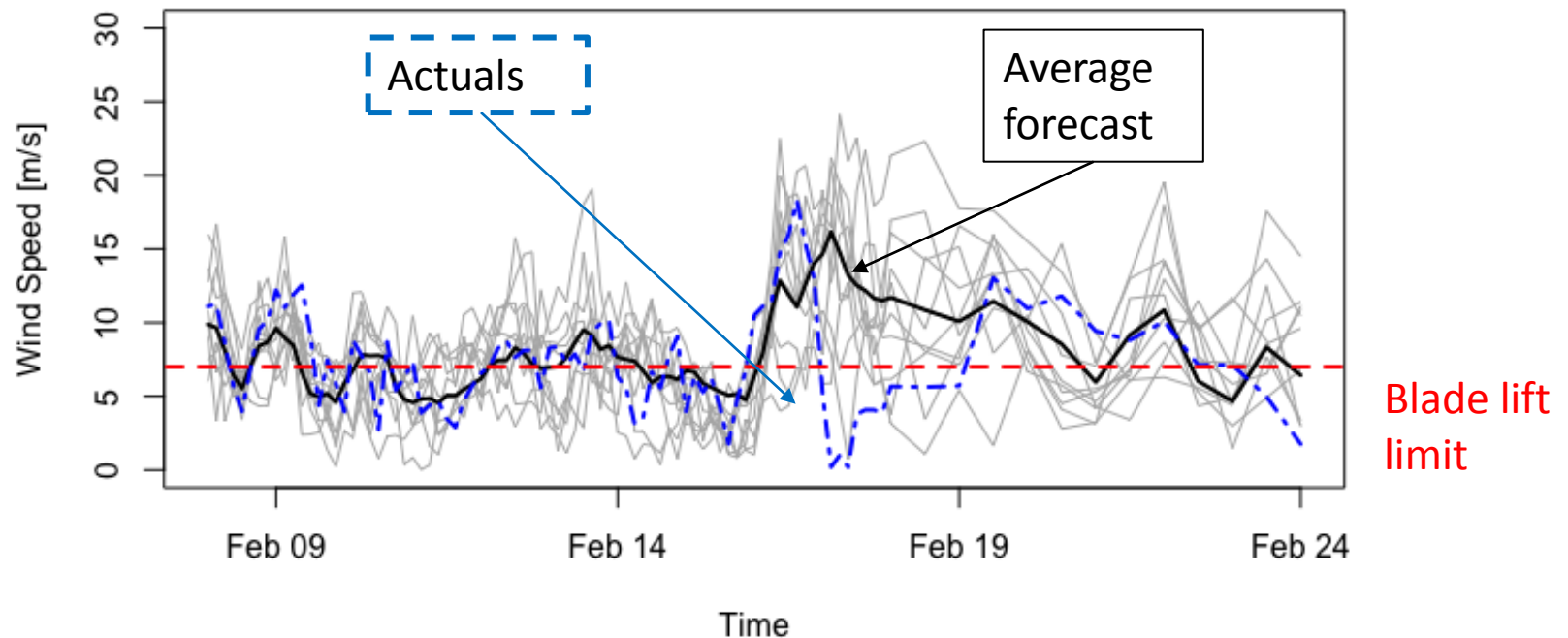
# The Scheduling Challenge

## Inputs

Weather Forecast

Weather Scenarios

- Probabilistic forecast (GFS/NOAA) produced as required for scenario generation
- Forecast errors sampled from statistical model, captures forecast uncertainty



# The Decision-Maker



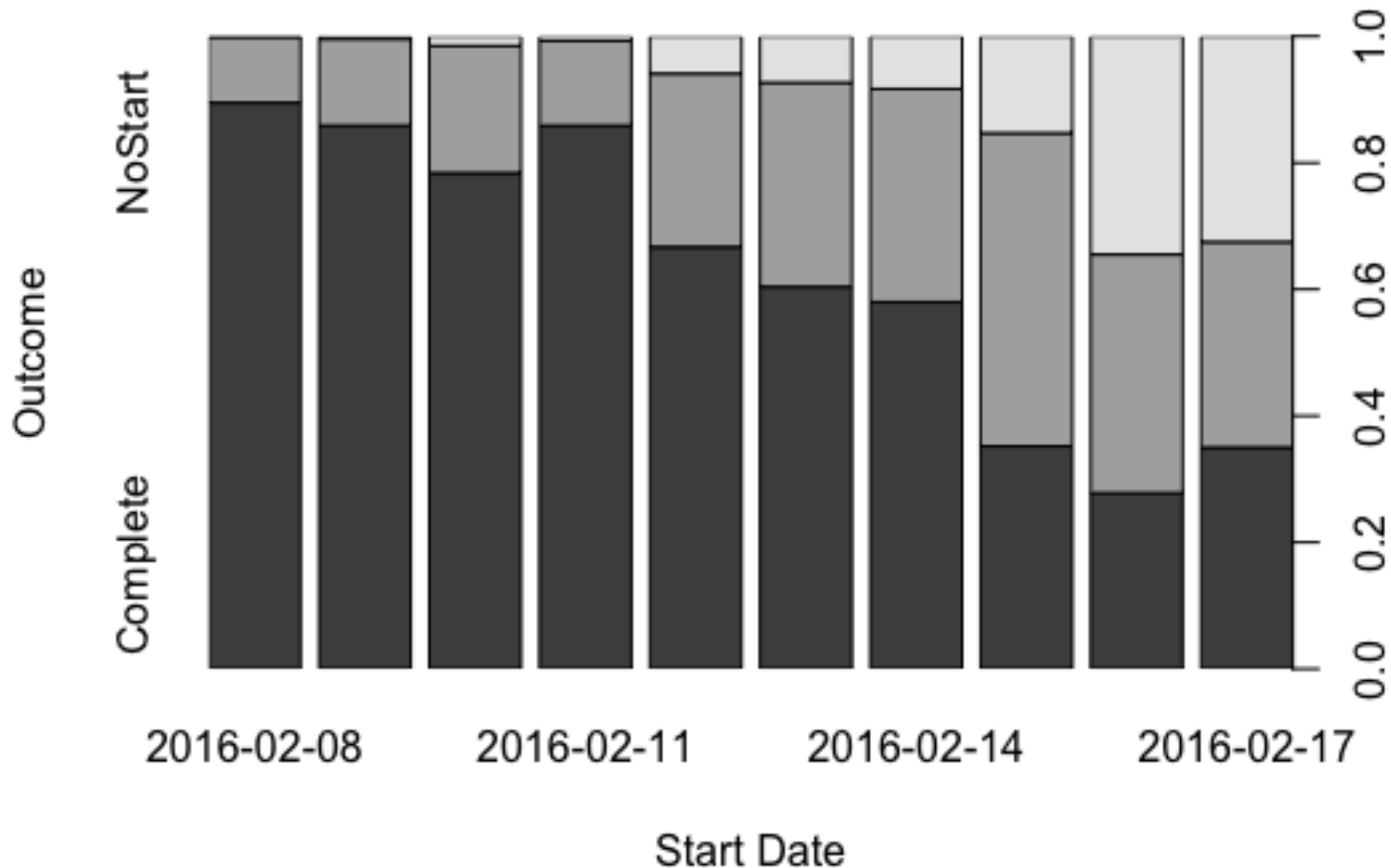
- Technician KPI
  - Job Completion
  - Downtime**Simple decision**



- Budget holder KPI
  - OPEX reduction
  - Yield increase**Detailed decision**

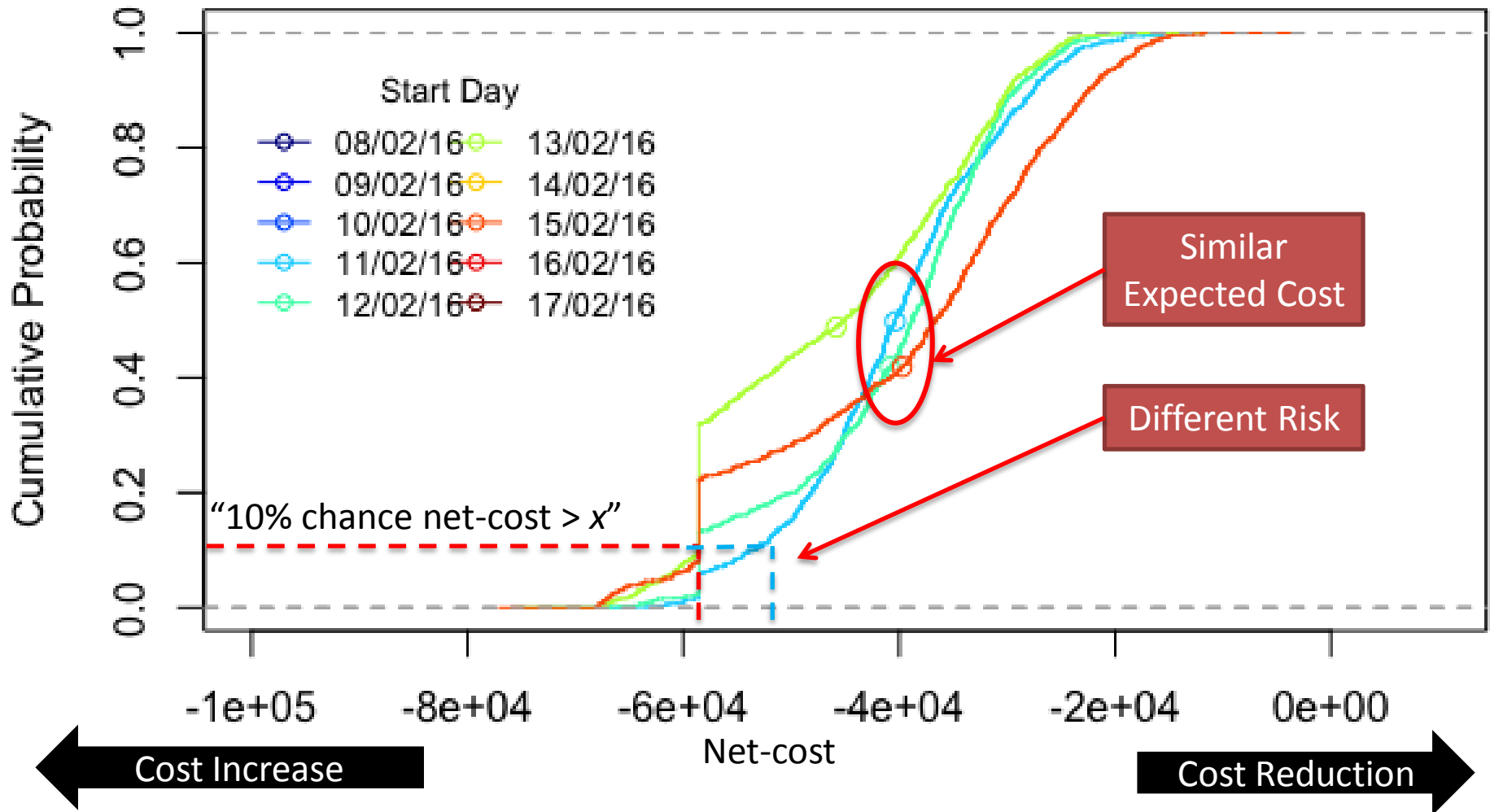
# Outputs – Simple Decision

- KPI: Job Completion



# Outputs – Detailed Decision

- KPI: OPEX Reduction



# Final Thoughts

- This approach could apply to **any** operational decision
- Similar statistical framework can support decisions such as:
  - When to run/de-rate/shut-down
  - When to replace component vs temporary fix
- **Come chat with us about your application!**

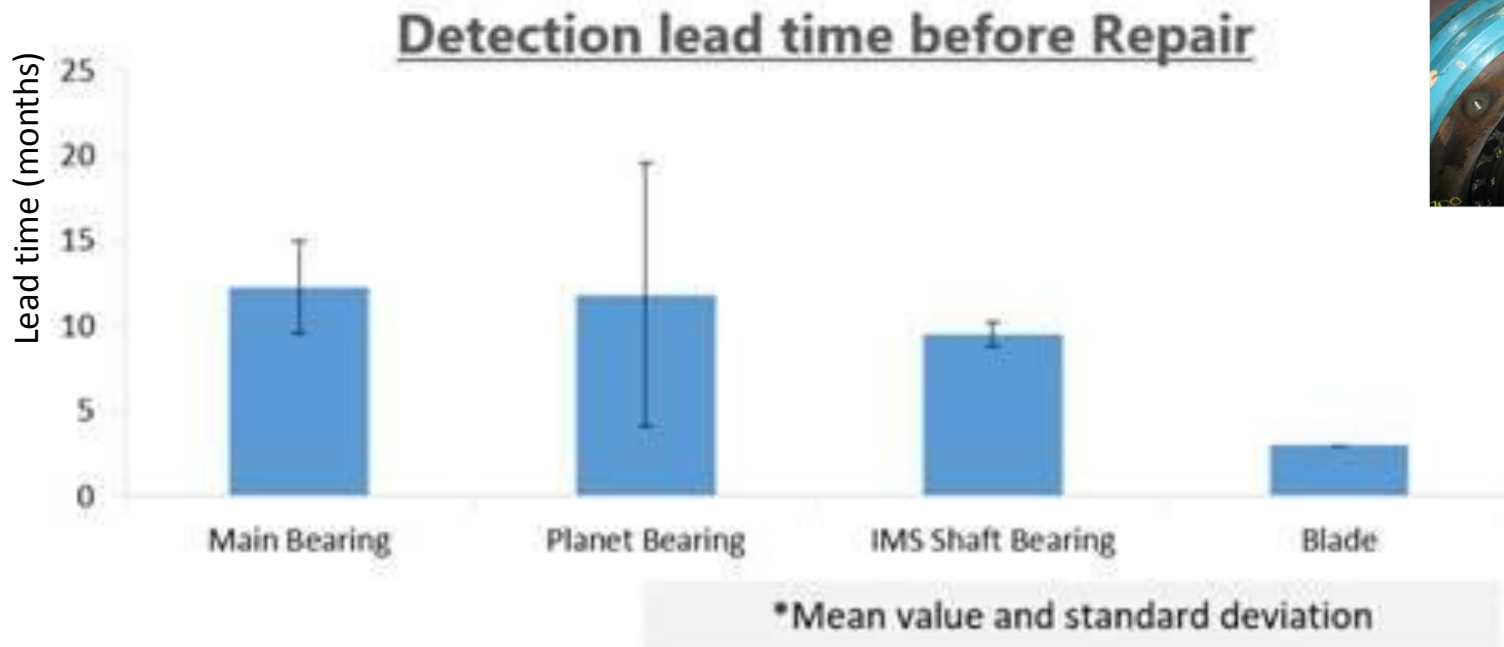


Figure 8: Failures detected and confirmed along with detection lead times.



# Thank You



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