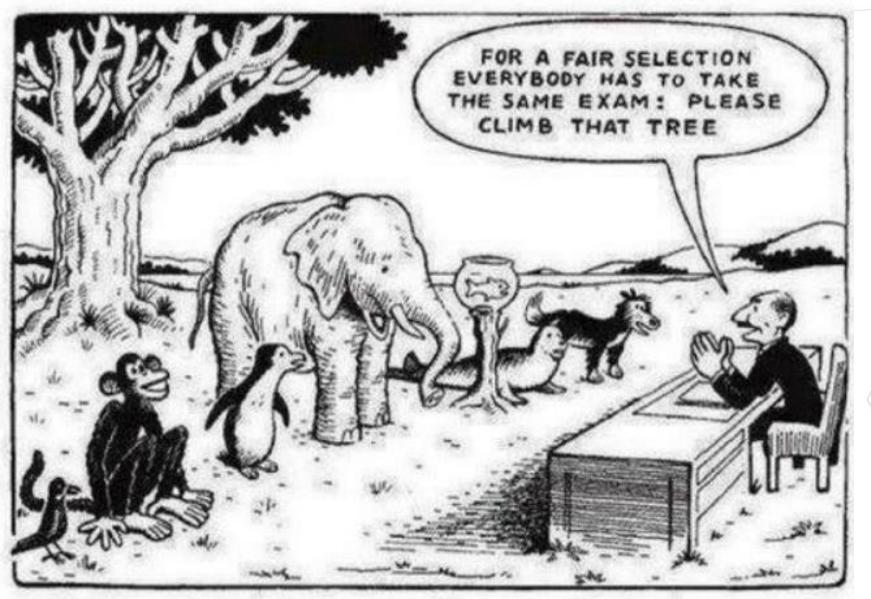
One Size Does Not Fit All!

The Diversity & Evolution of QRA Throughout a Project Lifecycle







One Size Does Not Fit All!

The Diversity & Evolution of QRA Throughout a Project Lifecycle

...Or

All the things that Ai Still Can't Do!

...Or

All the things that you could be doing, but probably aren't!













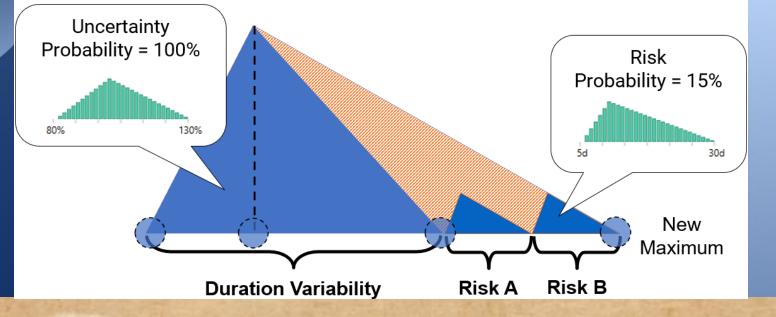






Winning at QRA!

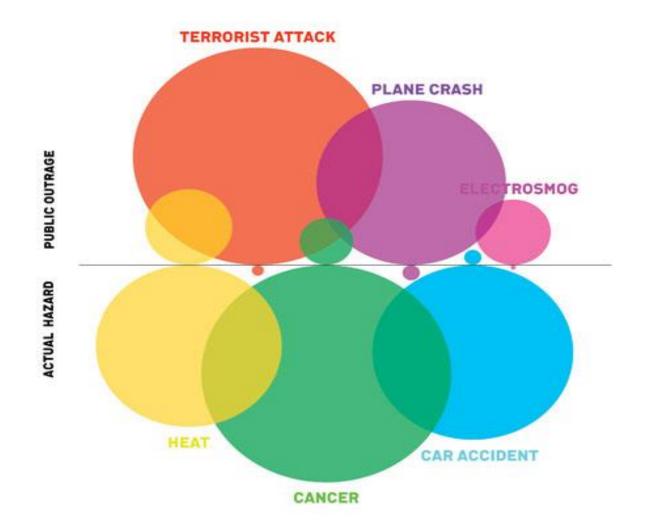
Quantitative Risk Analysis







RISK PERCEPTION AND ACTUAL HAZARDS

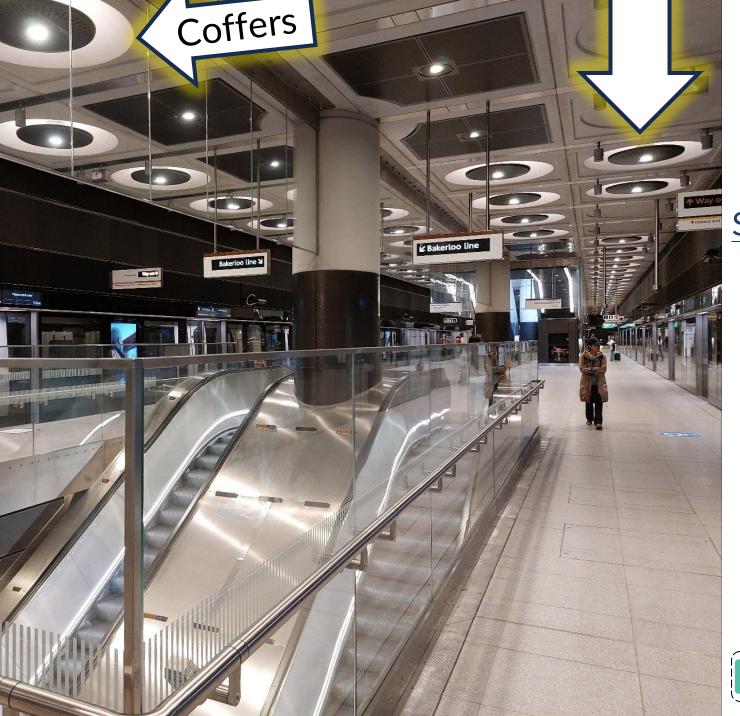


2010Created Consistent Capture of "Actuals"

- Compare Perception of Risk vs. Reality of Risk.
 - Proportional Mitigation Recommendations
- Improved Future Estimates
- Lessons Learned & Shared









2012

Supported a Business Case for Pre-Fab Modules to de-risk a Megaproject

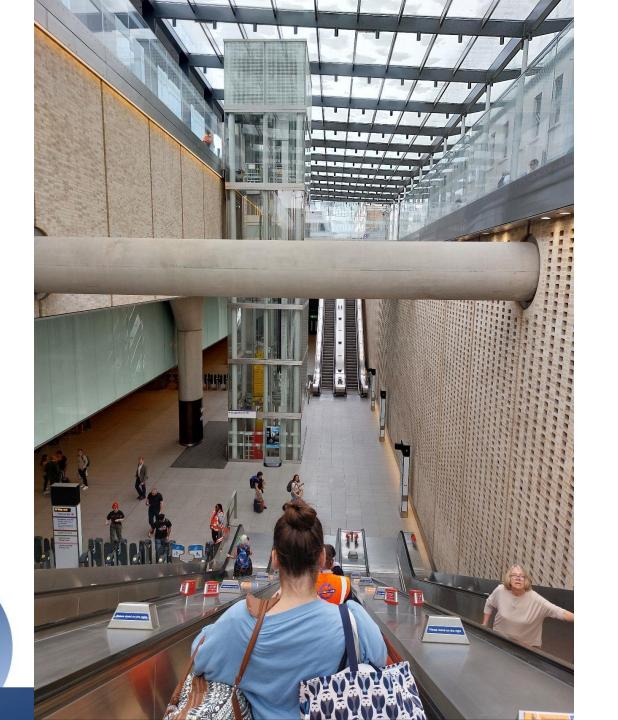
- Positive not Doom (Risk as a force for Good)

- Genuinely Helped











2013

Justified millions dollars worth of additional contingency via Change Control

"This is unheard-of!"







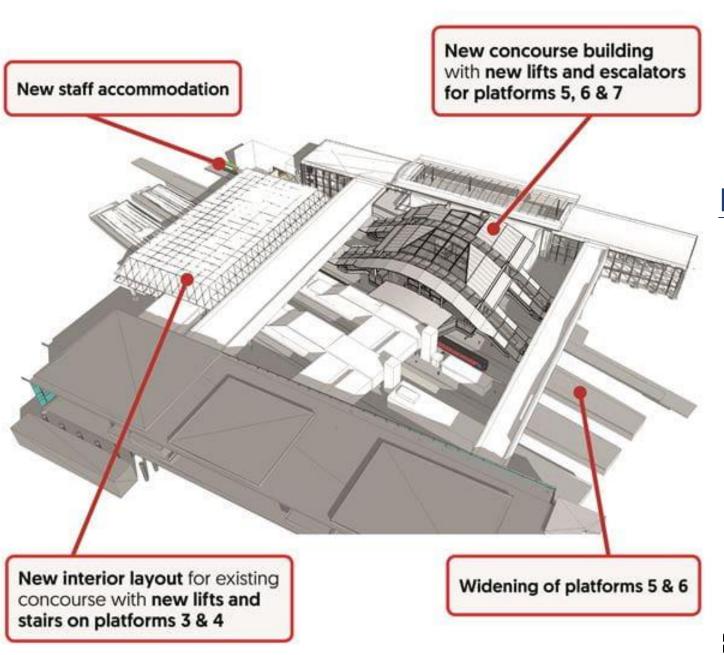


2015
QSRA challenged key railway access constraint

- Convinced 3rd Party to re-plan their work
 - It was easier than expected
 - All parties Win-Win









My QRA Fundamentally Challenged the Design of Int. Airport's Railway Station

2016

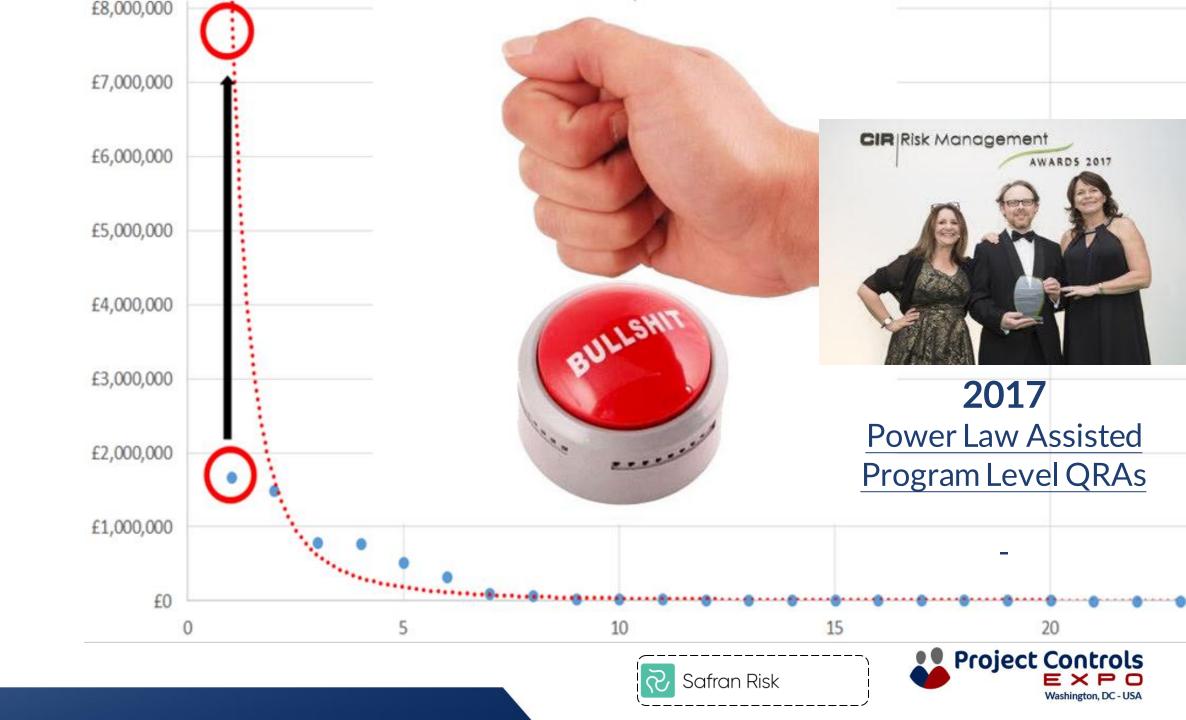
"Best QRA I've ever seen"

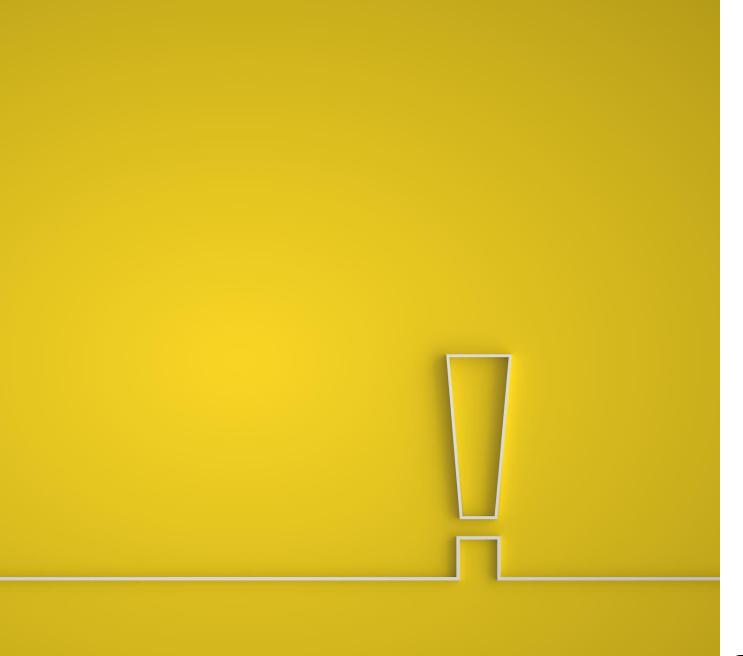
- ECI Phase compared options, to find One that could fit the ridged budget

- Great Collaboration Effort











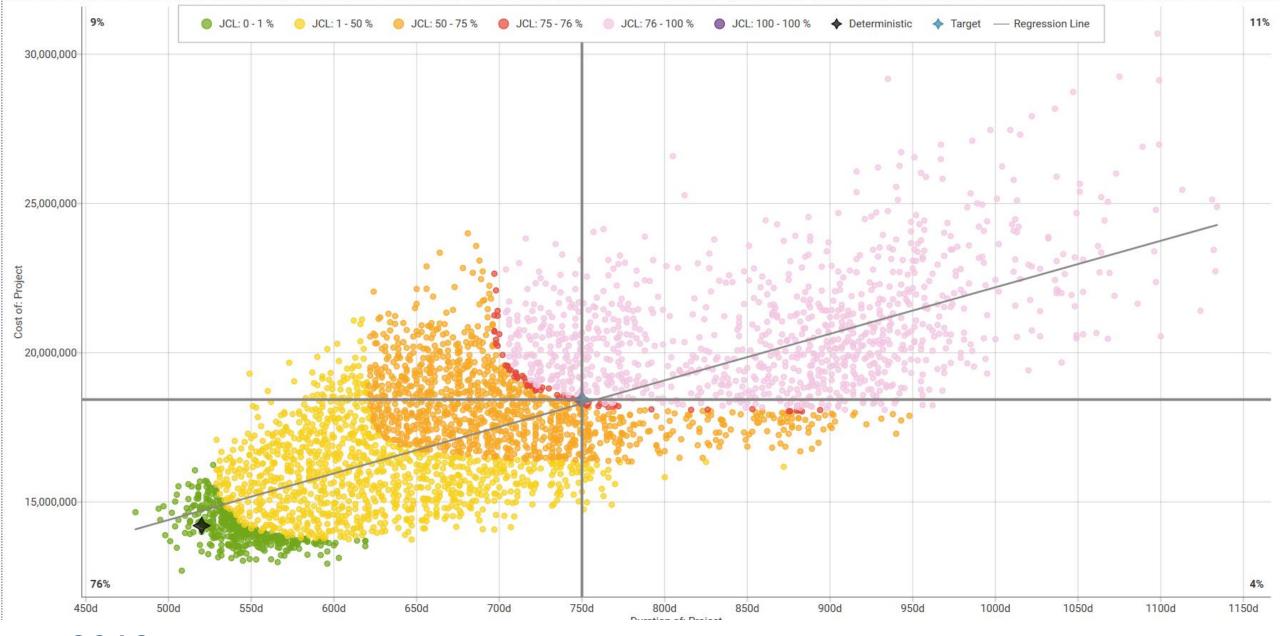
- Learning the hard way
That some innovations don't always
scale-up!

- Making Mistakes is How we Learn









2019 Discovering Safran Risk's <u>alternative</u> approach to ICSRA with CBS + Introducing Joint Confidence Levels (JCL)

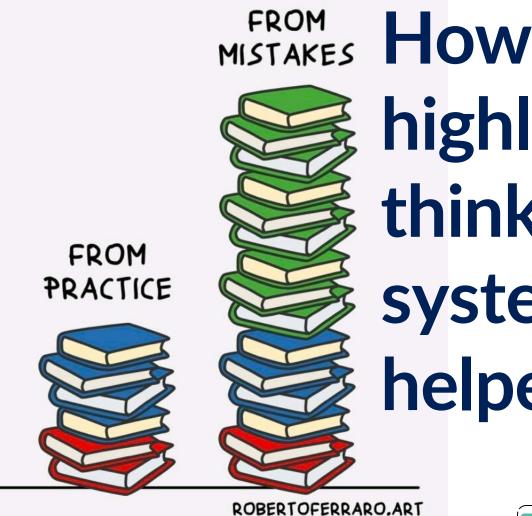


Safran Risk

HOW MUCH YOU LEARN

FROM

THEORY



FROM How many of my highlights do you think a Forecasting Ai system would have helped?











Reality Check

Burden of Interpretation

I think the Duration is... X
Risk is Y
Cost is... Z

Simulation

Model Outputs I **think** it's saying... X

But I don't really know how to check









QRA - OUTCOMES



Quality Improvements & Insight Discovery

Forecasting

Project Phase / Lifecycle

Build

Concept Definition

Design

Handover & Close-Out





OUTCOMES QRA Use Cases





Handover & Close-Out Concept Definition Design Build

Safran Risk



OUTCOMES QRA Use Cases

Systemic Risk & Correlation Stress Testing

Manufacturer Warranty Period vs. Delayed Contractor Handover (Misaligned Liability Negotiations)

Decision Support Scenario

Comparison

Scope & Method Optioneering

Weather Downtime Modelling & Climate Scenario Testing

Change Management & Opportunity Validation

Contingency Discovery & Validation Setting

Contractor Handover Delay Exposure & Date Negotiation

Programme Recovery / Acceleration Cost Benefit Analysis Stress Testing

Expected vs. Risk Adjusted via Change Managed Future Revenue Models (Owner Operator)

Contractor Profit/Loss

Project Behaviour Anticipation via Conditional/Probabilistic Branching

Project Phase / Lifecycle

Definition Concept

Design

Build

Handover & Close-Out





QRA Use Cases

"Decision-Making Training Simulator"

> Identifying & Testing Multi-Mitigation Candidates

Quality **Improvements** Insight **Discovery**

Work-Package Historical Actual Performance

Contingency Discovery & Validation Setting

Project Phase / Lifecycle

Concept Definition Build Design

Handover & Close-Out





QRA Use Cases

"Decision-Making Training Simulator"

> Identifying & Testing Multi-Mitigation Candidates

Test Schedule Assumptions

Validate Schedule Logic

Work-Package Historical Actual Performance

Multi-Contractor Tender Plan/Risk Assessment Submission Comparison

Collaborative "What-If" Workshops & Test Hypothesis

Risk Adjusted Schedule, Near Critical Path(s), Critical Costs & Cashflow Visualised

Contingency Discovery & Validation Setting

> Estimate Uncertainty to Discrete Risk Driver Contribution + Rolling Wave

> > Project Phase / Lifecycle

Concept Definition Design

Build

Handover & Close-Out







QRA Use Cases

Identifying &

Testing Multi-

Mitigation

Candidates

"Decision-Making Training Simulator"

"Shut Down & Turn-Around" fast simulation for minute-by-minute forecasting/testing

Test Schedule

Assumptions Validate Schedule Logic

Work-Package Historical Actual Performance

Multi-Contractor Tender Plan/Risk Assessment Submission Comparison

Perceived Risk VS. Actual Impacted Risk Comparison & Lessons to feed into future projects

Collaborative "What-If" Workshops & Test Hypothesis

Risk Adjusted Schedule, Near Critical Path(s), Critical Costs & Cashflow Visualised

Contingency Discovery & Validation Setting

Business Intelligence Integration

Estimate Uncertainty to Discrete Risk Driver Contribution + Rolling Wave

Project Phase / Lifecycle

Concept Definition Design

Build

Handover & Close-Out



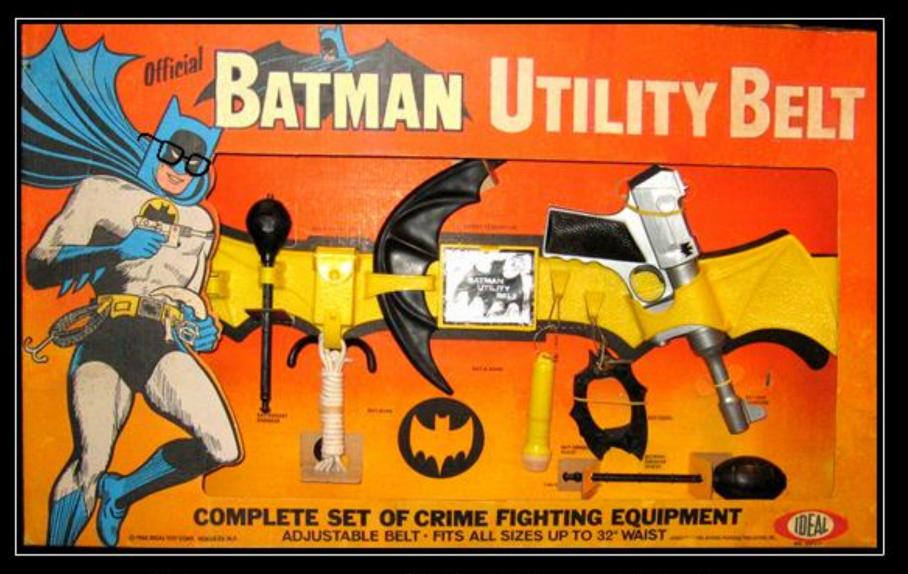




OUTCOMES QRA Use Cases "Decision-Making Training Simulator" "Shut Down & Turn-Around" fast simulation Perceived Risk for minute-by-minute forecasting/testing Quality Actual Impacted Risk Test Schedule Assumptions Identifying & Testing **Improvements** Comparison & Lessons to Mitigation Candidates Validate Schedule Logic feed into future projects Multi-Contractor Tender Plan/Risk Work-Package Historical Insight Assessment Submission Comparison Actual Performance **Discovery** Collaborative "What-If" Workshops & Test Hypothesis Risk Adjusted Schedule, Near Critical Path(s), Critical Costs & Cashflow Visualised Contingency Discovery & Validation / Setting Business Intelligence Integration Estimate Uncertainty to Discrete Risk Driver Contribution + Rolling Wave Systemic Risk & Expected vs. Risk Adjusted **Decision Correlation Stress Testing** & Climate Scenario Testina vs. Delayed Contractor **Support** Scope & Method Change Management & Future Revenue Models Optioneering Opportunity Validation (Owner Operator) Contingency Discovery & Validation / Setting Programme Recovery / Acceleration Scenario Cost Benefit Analysis Stress Testing Comparison Expected vs. Risk Adjusted Integrated Cost Schedule Risk Analysis Hybrid ICSRA Remaining Contingency Stress Testing & + Parametric Joint Confidence Level (JCL) Actual Progress/Performance Extrapolation via Change Managed Future Revenue Models **Forecasting** Contingency Discovery & Validation / Setting Delay Penalty Exposure (Owner Operator) Inflation/Escalation + Disallowable Cost Exposure Contractor Profit/Loss **Prolongation Calculations** Project Phase / Lifecycle Benefits Realisation Concept Definition Design Build Handover & Close-Out





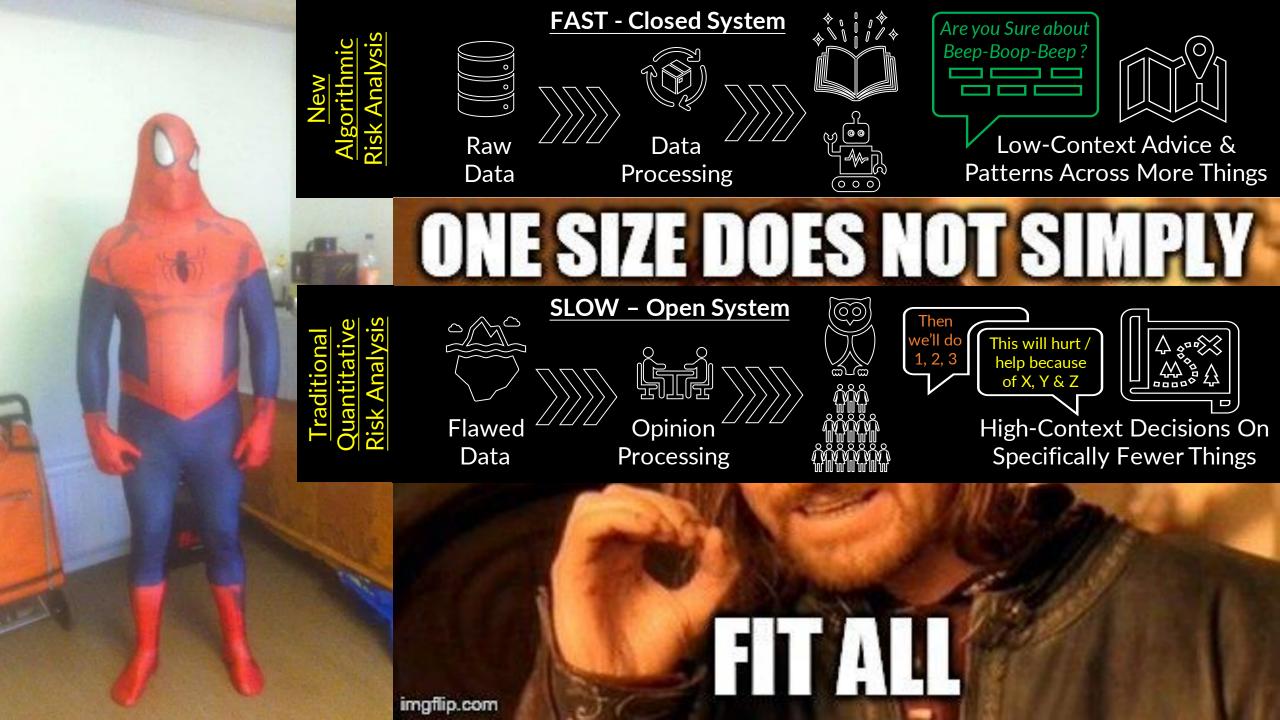


Batman Utility Belt

Because a regular belt's too mainstream







CONCLUSIONS

All models are wrong but some are useful

This remains true of both Traditional QRA and Ai that's trained on poor quality inconsistent data





George E.P. Box









- QRA can be used in more ways than most people realize.
- Ai (<u>currently</u>) only performs a fraction of what I've shown today
- More value hidden within the collaboration effort than the outcome
- Don't forget the humans in your future digital toolsets
- Don't discard one method at the expense of another, seek a blended approach to gain maximum advantage (eventually QRA will get Ai boost)
- Do what you can, with what you have! To answer specific, targeted questions. Help your colleagues with what matters to them!









