THOUGHTS ON V&V'S UNANSWERED QUESTIONS

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Medtronic
Further, Together

THE UNANSWERED QUESTIONS

What is the most useful, accurate, and justifiable way to convey VVUQ information to people who need to make decisions based on simulations?

How do we translate metrics we can compute rigorously into metrics to be used for decision making?

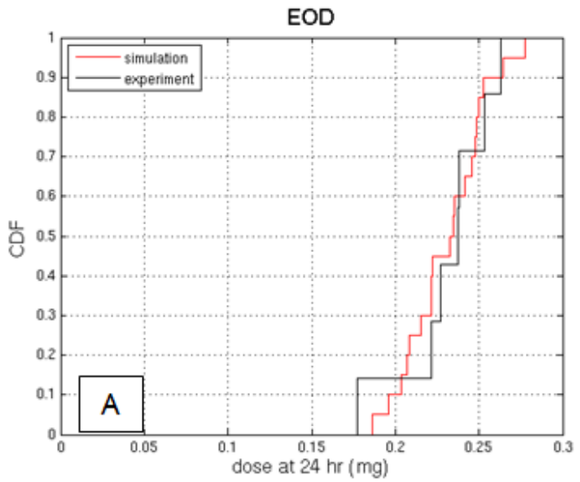
Assuming, as seems to be the case, that there will always be a problem of “unknown unknowns” in VVUQ, how do we account for those in reporting VVUQ results? Is there away to do so that recognizes the subjective nature of such assessments, but is still responsible engineering practice? Is there a scientifically or mathematically valid framework for this?

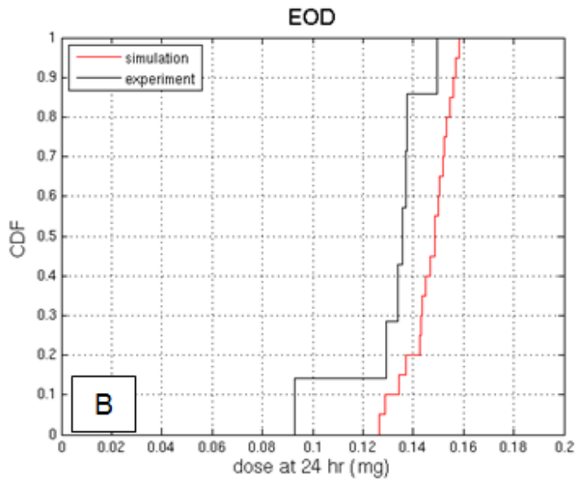
WHAT IS THE MOST USEFUL, ACCURATE, AND JUSTIFIABLE WAY TO CONVEY VVUQ INFORMATION TO PEOPLE WHO NEED TO MAKE DECISIONS BASED ON SIMULATIONS?

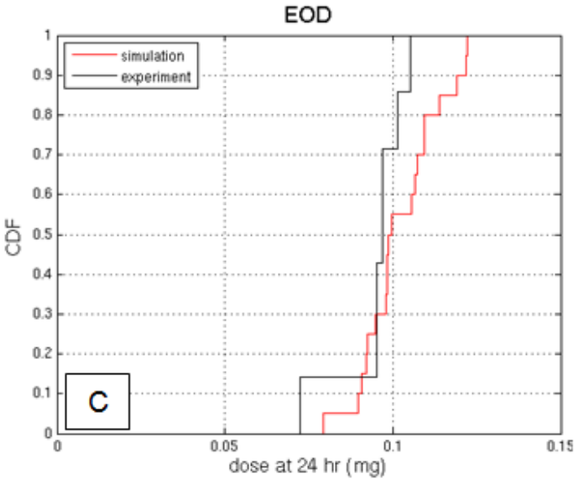
- Who are decisions makers?
  - Not necessarily schooled in VVUQ
  - Not necessarily schooled in modeling
  - Not necessarily an engineer
- Examples from medical device industry
  - Neuroscientist
  - Regulators
  - Physicians
- Proximal vs distal decision makers

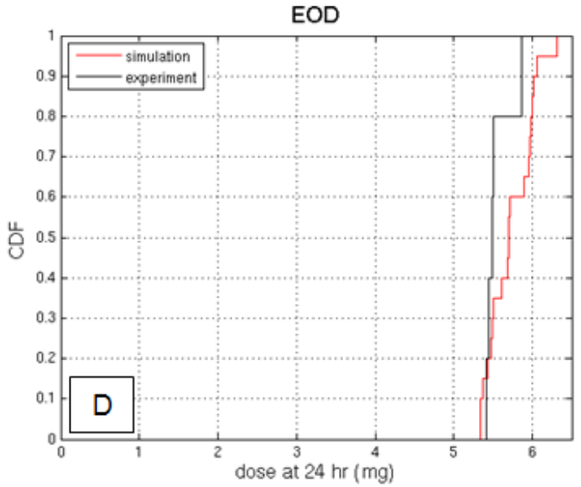
- Some of these don’t *want* to understand VVUQ information!

- Do all decision makers *need* to understand VVUQ?
  - How many (distal) decision-makers understand the validity/uncertainty of *tests*?



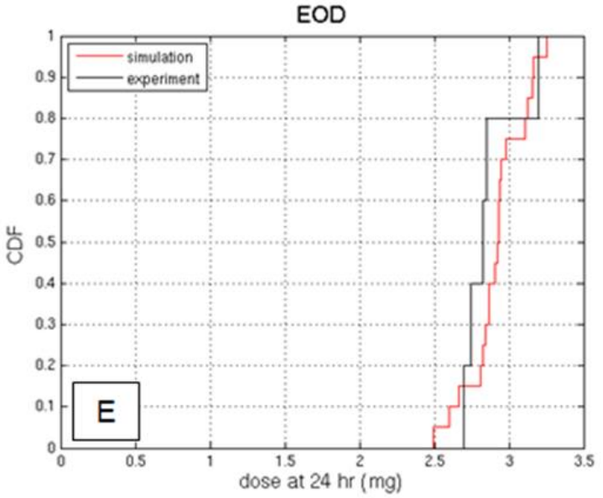


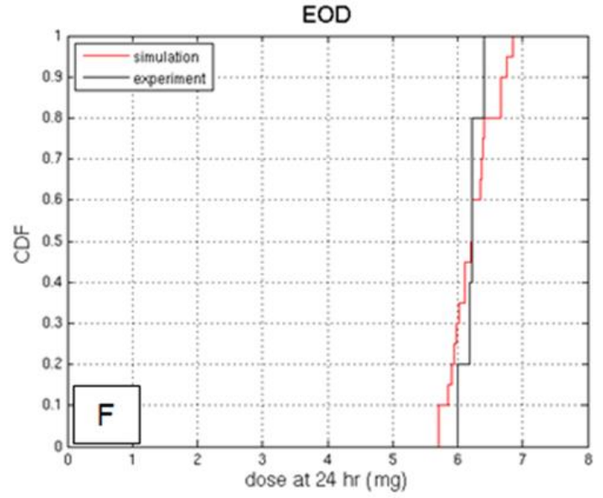


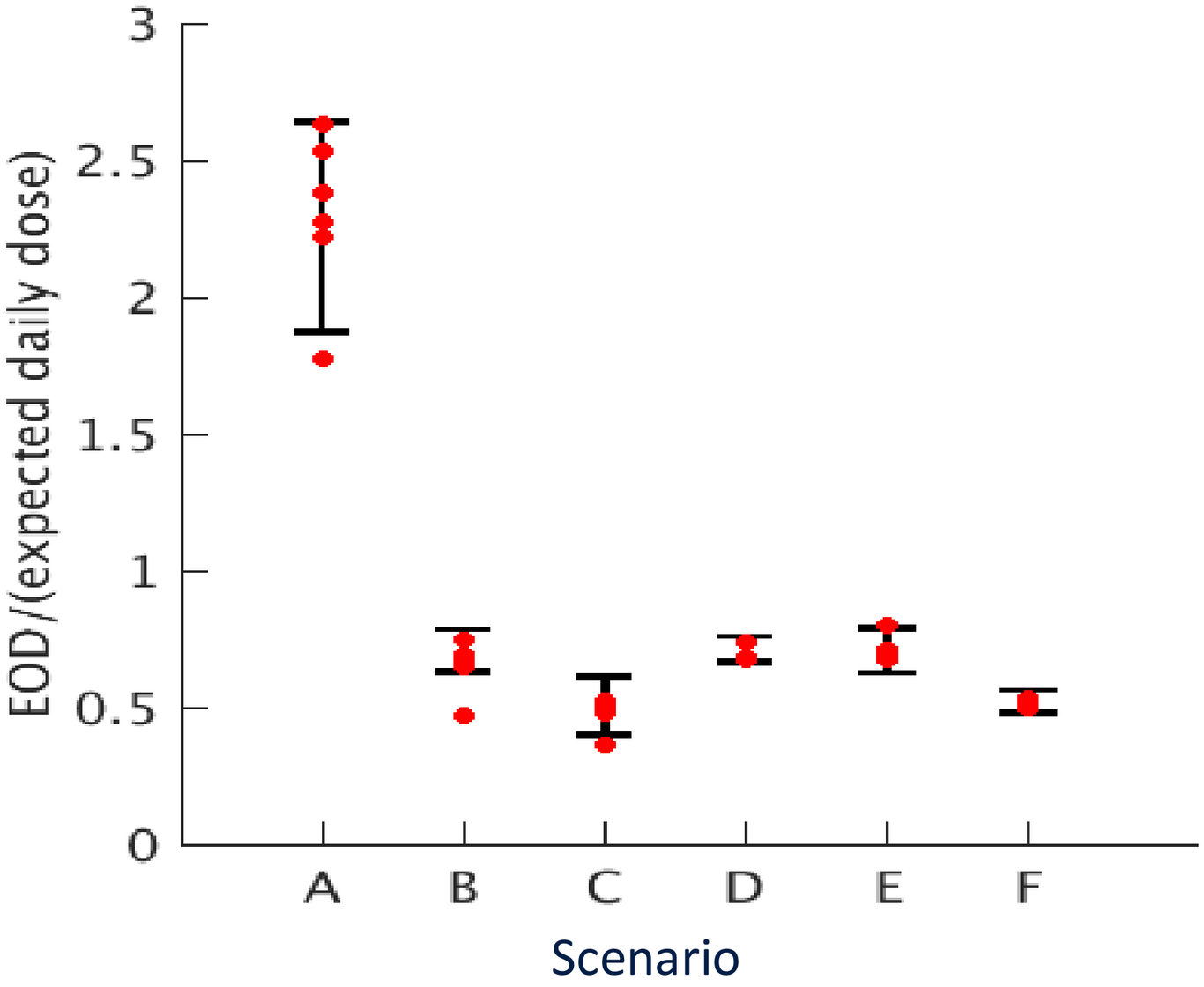


What is the best way to convey *any* technical information to decision-makers?

Visual methods are always good







How you plot is as important as *what* you plot.

We ought to be students of visual information design.

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HOW DO WE TRANSLATE METRICS WE CAN COMPUTE RIGOROUSLY INTO METRICS TO BE USED FOR DECISION MAKING?

- Assume all decision makers know basic statistics
  - Confidence intervals
  - +/- statements of accuracy/uncertainty

- “The model is accurate to within +/- X%”

- Example: area metric can be normalized

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HEALTH

Influential Covid-19 model uses flawed methods and shouldn't guide U.S. policies, critics say

By SHARON BEGLEY @sxbegle / APRIL 17, 2020

Uncertainty quantification for the modeling of the Covid-19 outbreak

Location

Zoom

Wednesday, April 15, 2020 12:00 PM
https://stanford.zoom.us/j/649021736?pwd=cE1ONS9xQ2EzVktXaUtnMSt4VzJYQT09
Josselin Garnier (Ecole Polytechnique)

Modeling coronavirus: 'Uncertainty is the only certainty'

By SETH BORENSTEIN and CARLA K. JOHNSON April 7, 2020

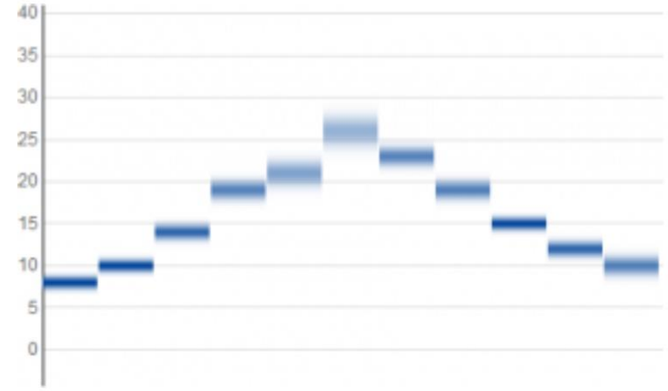
Lack of data makes predicting COVID-19's spread difficult but models are still vital

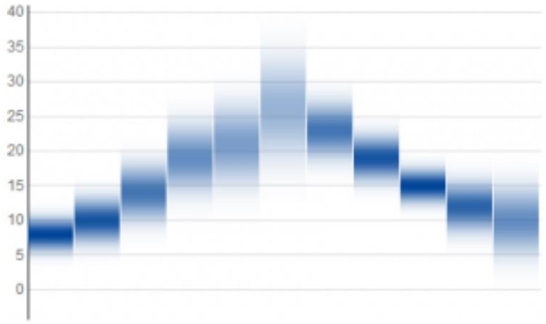
April 15, 2020 8.12am EDT

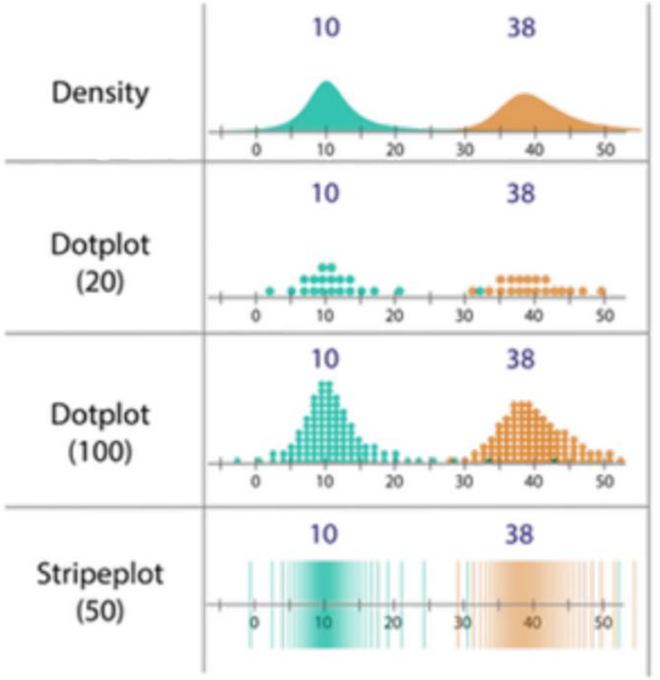
Perspective

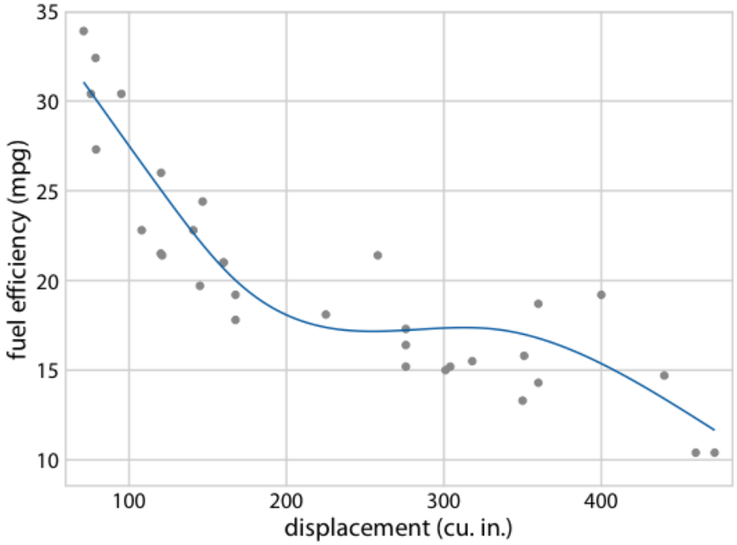
Wrong but Useful — What Covid-19 Epidemiologic Models Can and Cannot Tell Us

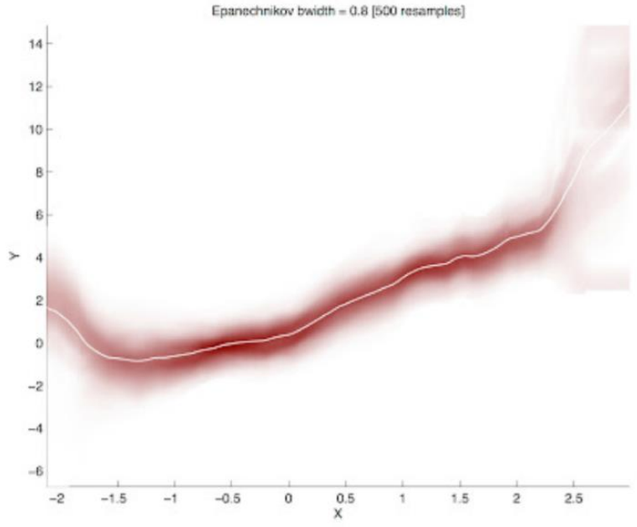
Inga Holmdahl, S.M., and Caroline Buckee, D.Phil.

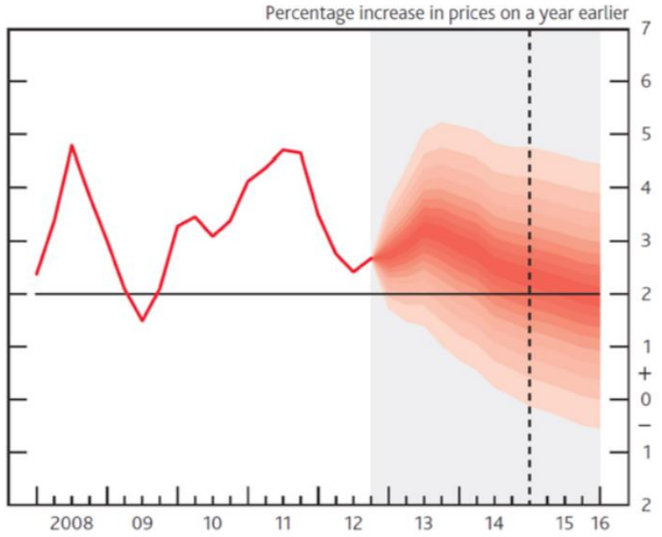












https://serialmentor.com/dataviz/visualizing-uncertainty.html

https://www.velir.com/blog/2013/07/11/visualizing-data-uncertainty-experiment-d3js

https://repository.library.northeastern.edu/files/neu:cj82rk31w/fulltext.pdf