

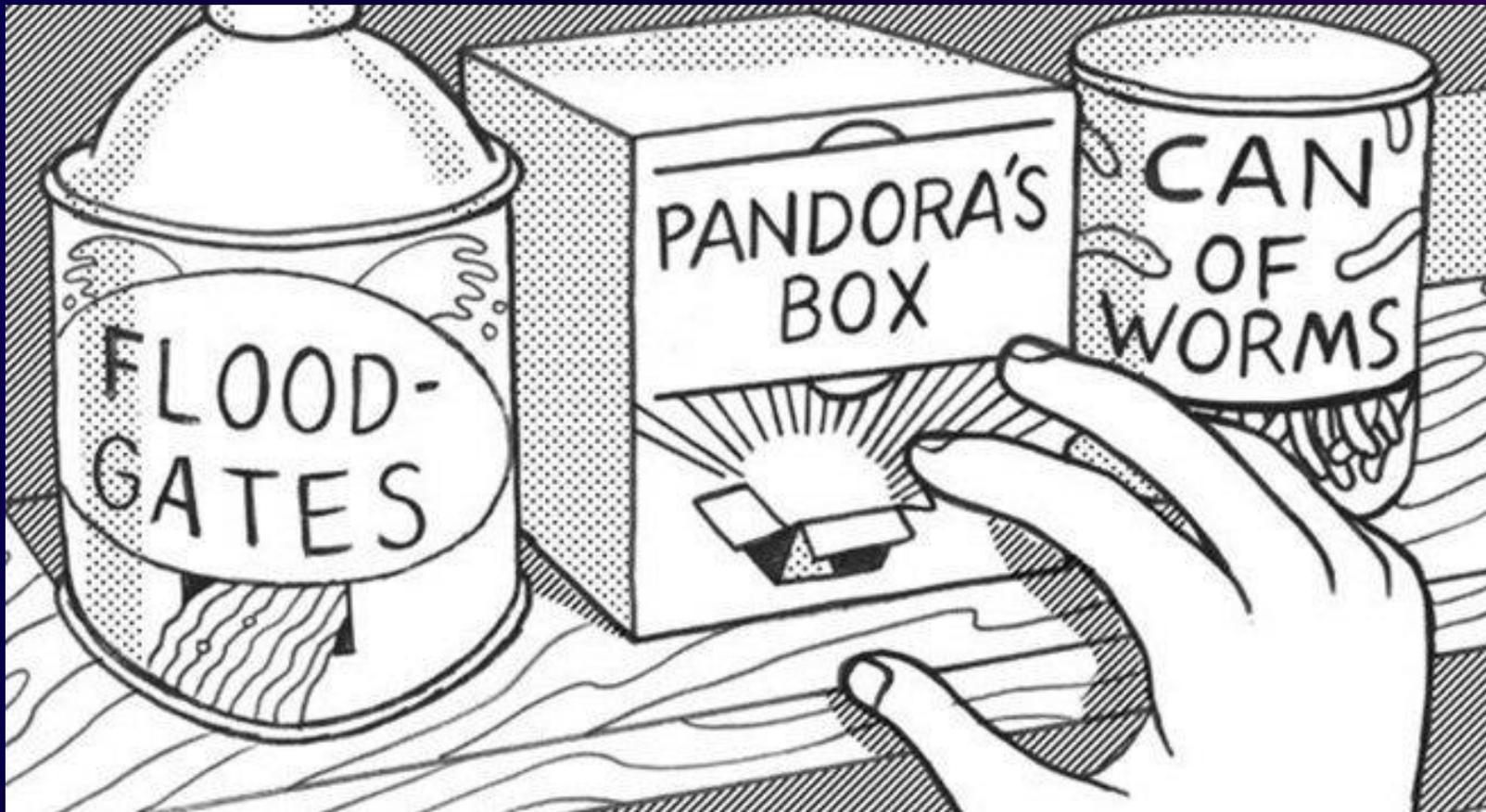
Uncertainty

Science-Practice roadshow, 24 May 2022: webinar

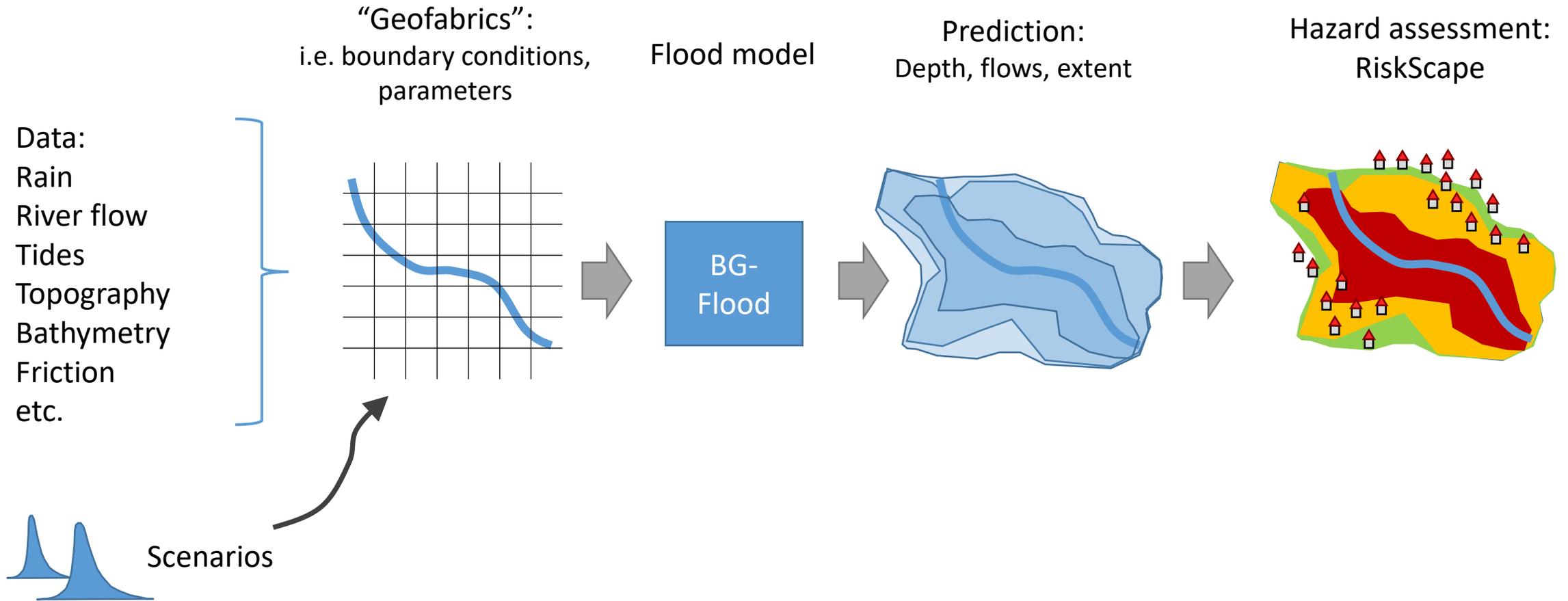
Te whāriki ō te wai

Mā te haumarū ō ngā puna wai ō Rākaihautū ka ora mo ake tonu

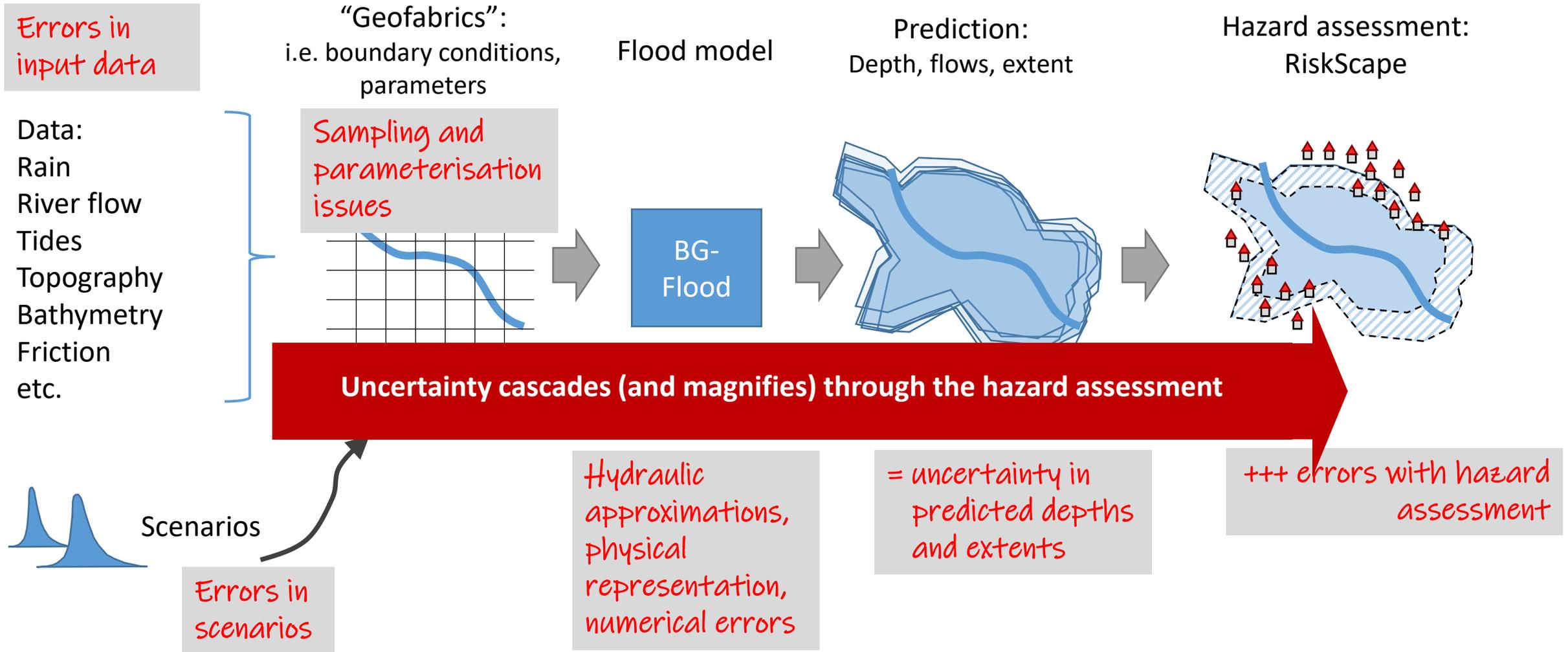
What does uncertainty mean to you?



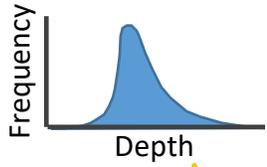
Assessing flood risk...



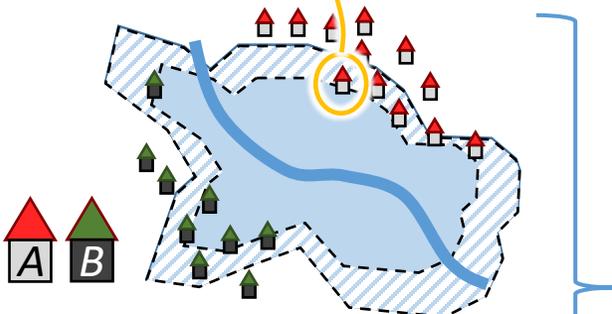
... through a cascade of uncertainty...



... uncertainty which continues through the hazard assessment process:

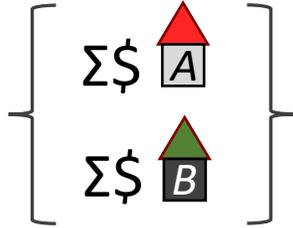


Variability in depth,
flows at building level



Infrastructure data,
e.g.:
Building footprint,
type, construction,
floor height

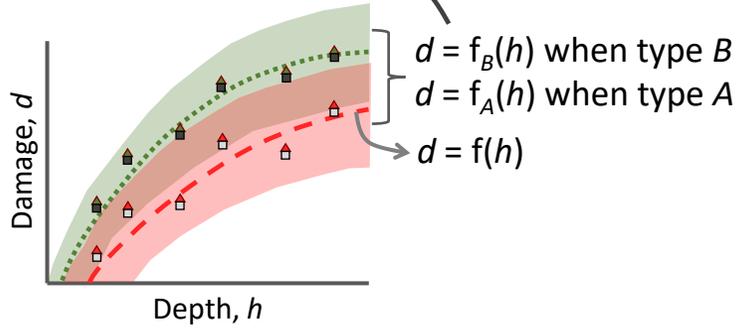
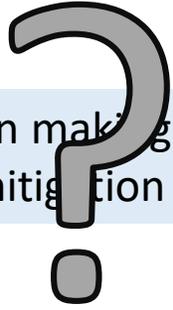
Errors in
input data...



= \$



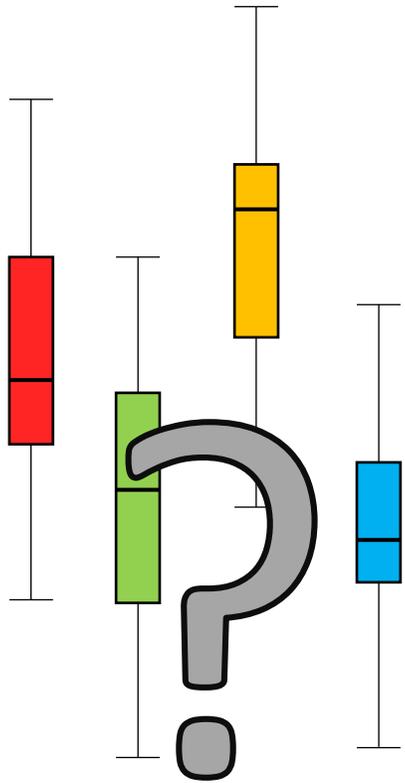
Decision making, e.g.,
mitigation



Uncertainty in depth/flow-
damage relationships

= uncertainty in
impact assessment

... leading to decision making and social implications...



Technical uncertainty in flood risk assessment



What does this mean for me?
For the outcomes I want?

Will it flood again soon?
Will the next flood be bigger?
Should I move?

Will I get insurance?
What happens if I can't?

Social, economic and political contexts
(Uncertainty in everyday decisions)

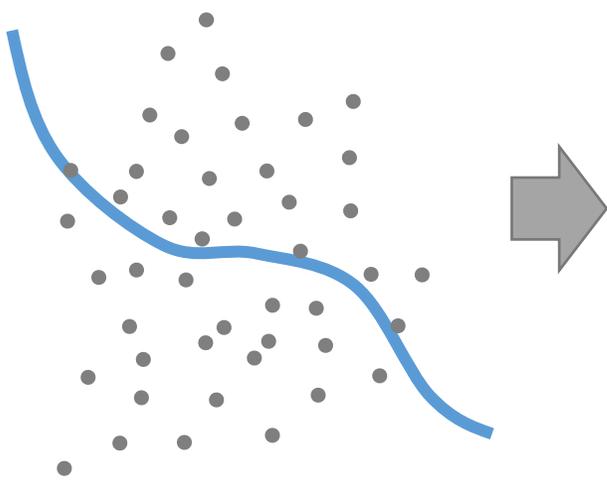
How will my decision
be received by others?

What will happen if I
make this choice?

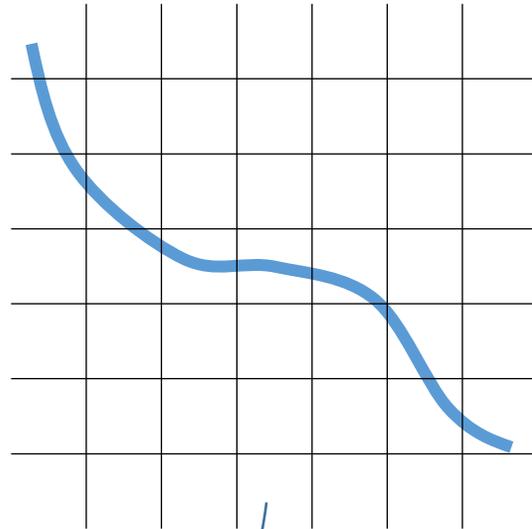
Will this action make a difference?

Example: uncertainty through grid creation

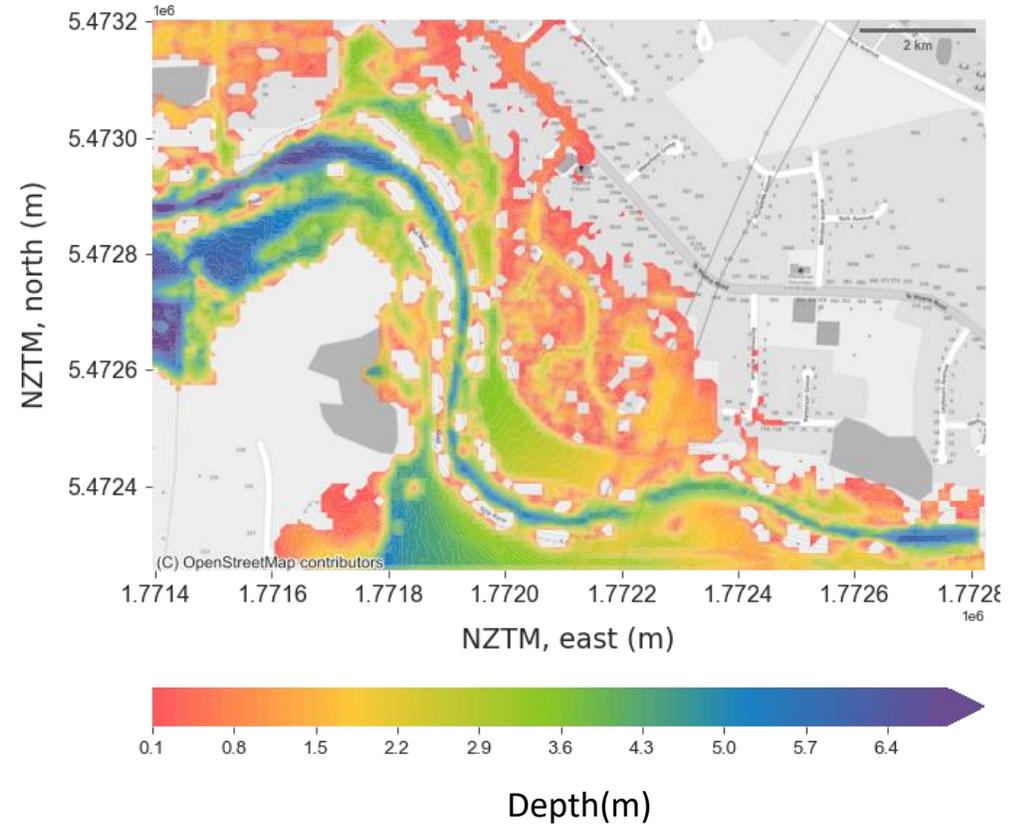
LiDAR point cloud data
require processing sampling
onto a model grid.



Create grid (geofabrics)



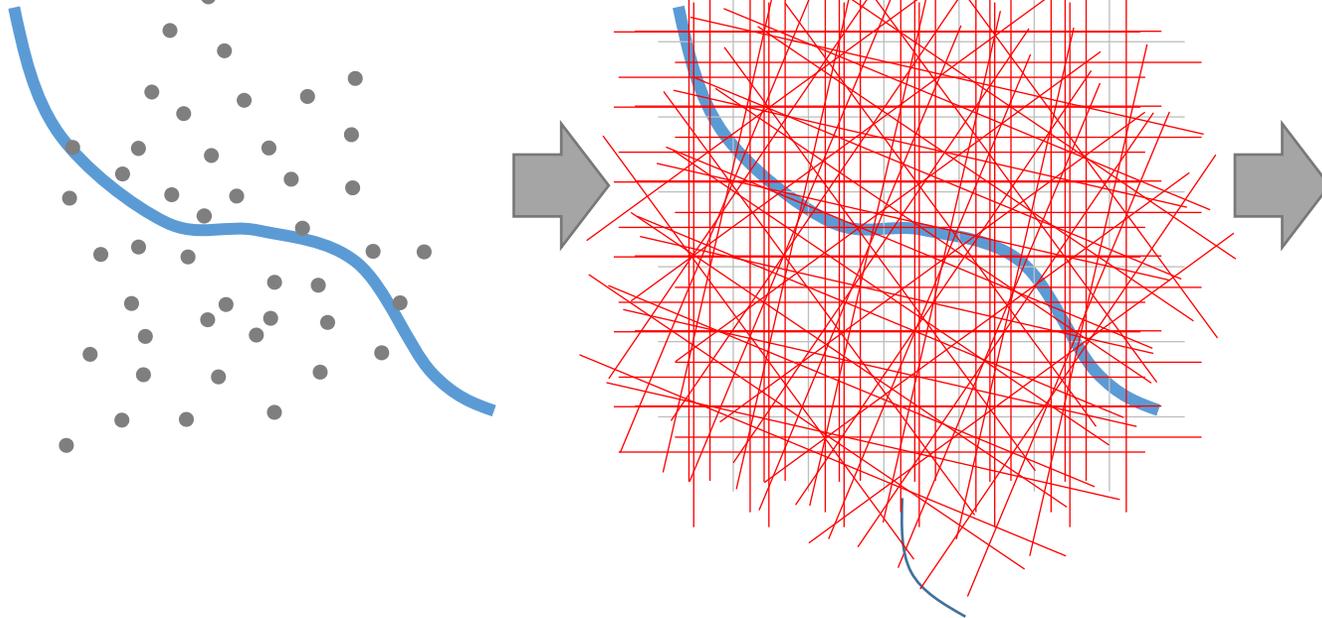
Usually an unrotated grid is used without
considering sampling issues (i.e., this is the
default position).



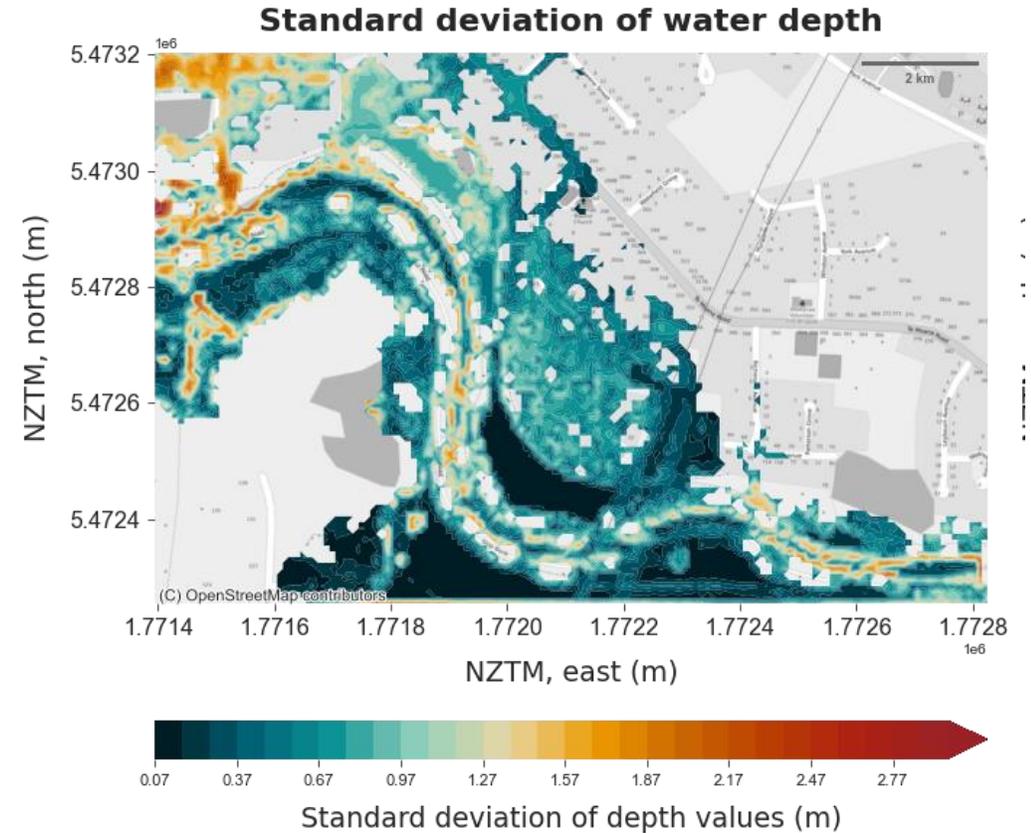
Credit: Martin Nguyen

Example: uncertainty through grid creation

LiDAR point cloud data
require processing sampling
onto a model grid.



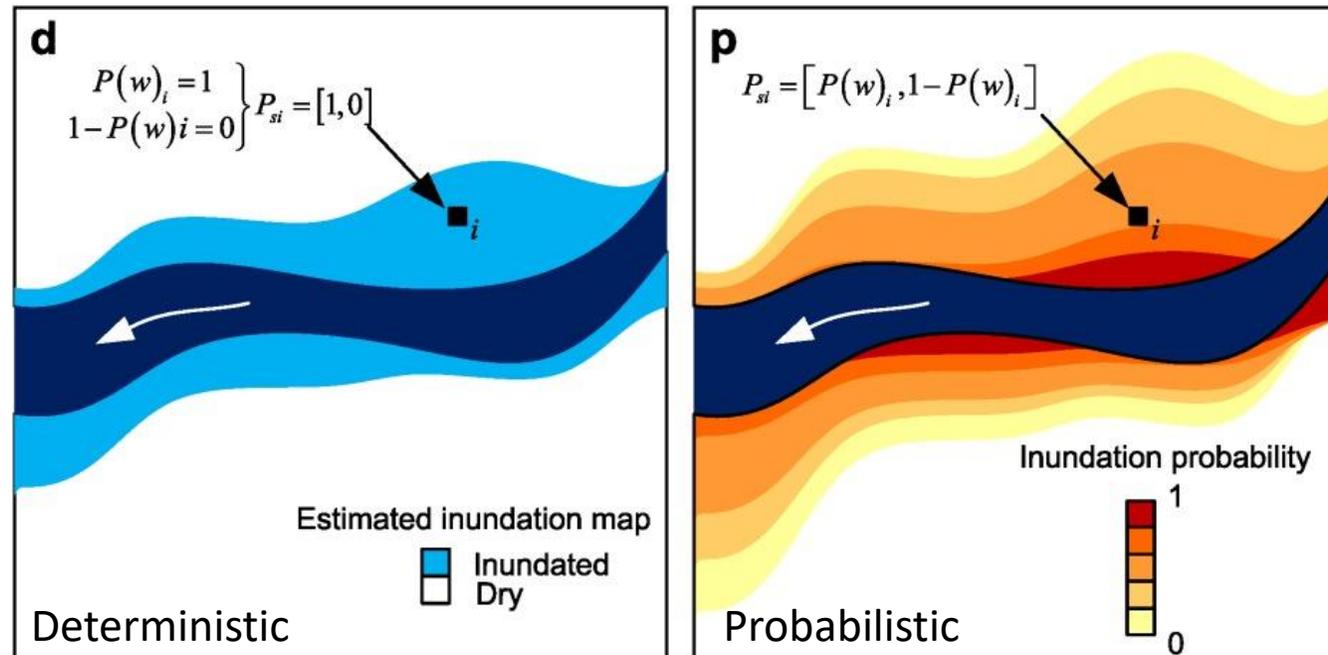
Rotated/ offset grid: leads to variability in topographic
representation, e.g. differing alignments of linear features.
(this is not an issue in FEM meshes, but those have their
own challenges)



Credit: Martin Nguyen

How do we communicate risk with uncertainty?

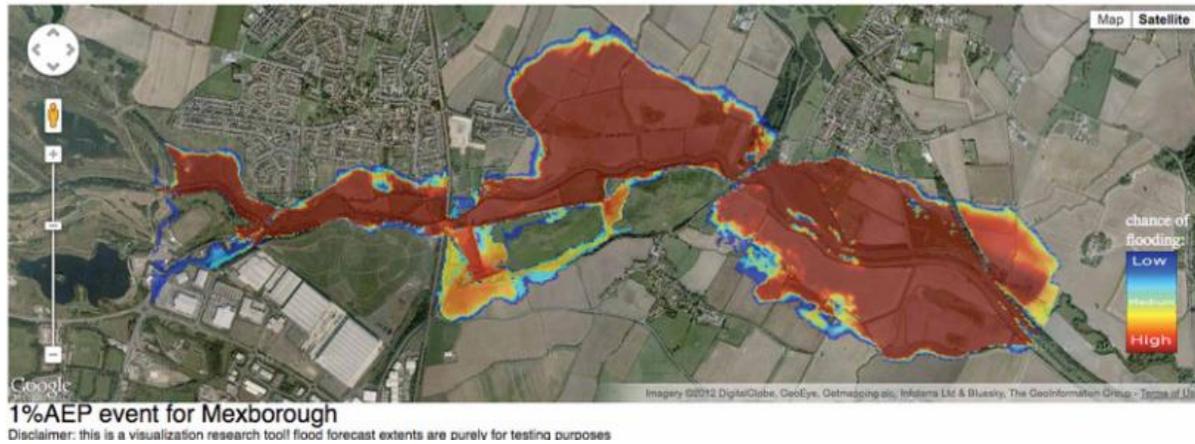
We need to move from deterministic to probabilistic mapping:



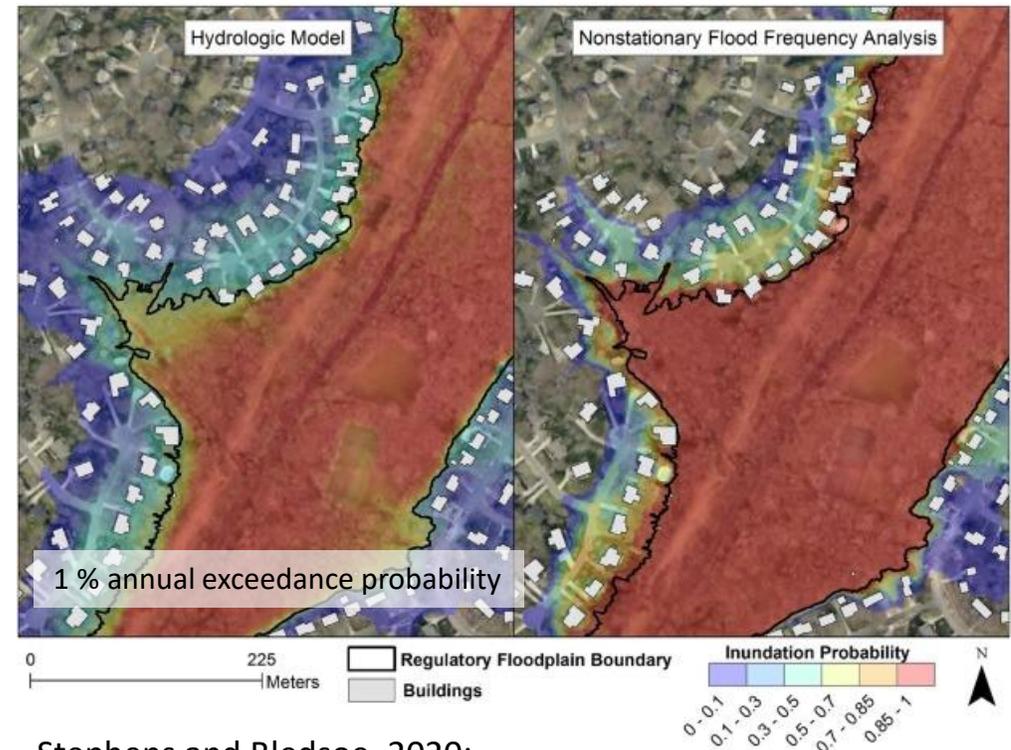
Alfonso et al. 2016: [doi:10.1002/2015WR017378](https://doi.org/10.1002/2015WR017378)

What are the priorities for mapping flood risk with uncertainty?

How do we communicate risk with uncertainty?



Beven et al. 2015: [doi:10.1080/15715124.2014.917318](https://doi.org/10.1080/15715124.2014.917318)



Stephens and Bledsoe, 2020:
[doi:10.1016/j.ancene.2019.100231](https://doi.org/10.1016/j.ancene.2019.100231)

What are the priorities for mapping flood risk with uncertainty?

Summary

1. Uncertainty cascades through the flood risk assessment process in a complex way
2. Decision making and social implications
3. How do we communicate flood risk with its uncertainty?