ESTIMATION AS UNCERTAINTY REDUCTION

What is this estimation thing, anyway?

Michael Godeck

Sorting out time and materials...

Estimation is like of a problem of topography, where we're mapping time and materials to a schedule to reveal the landscape where the project will play out.
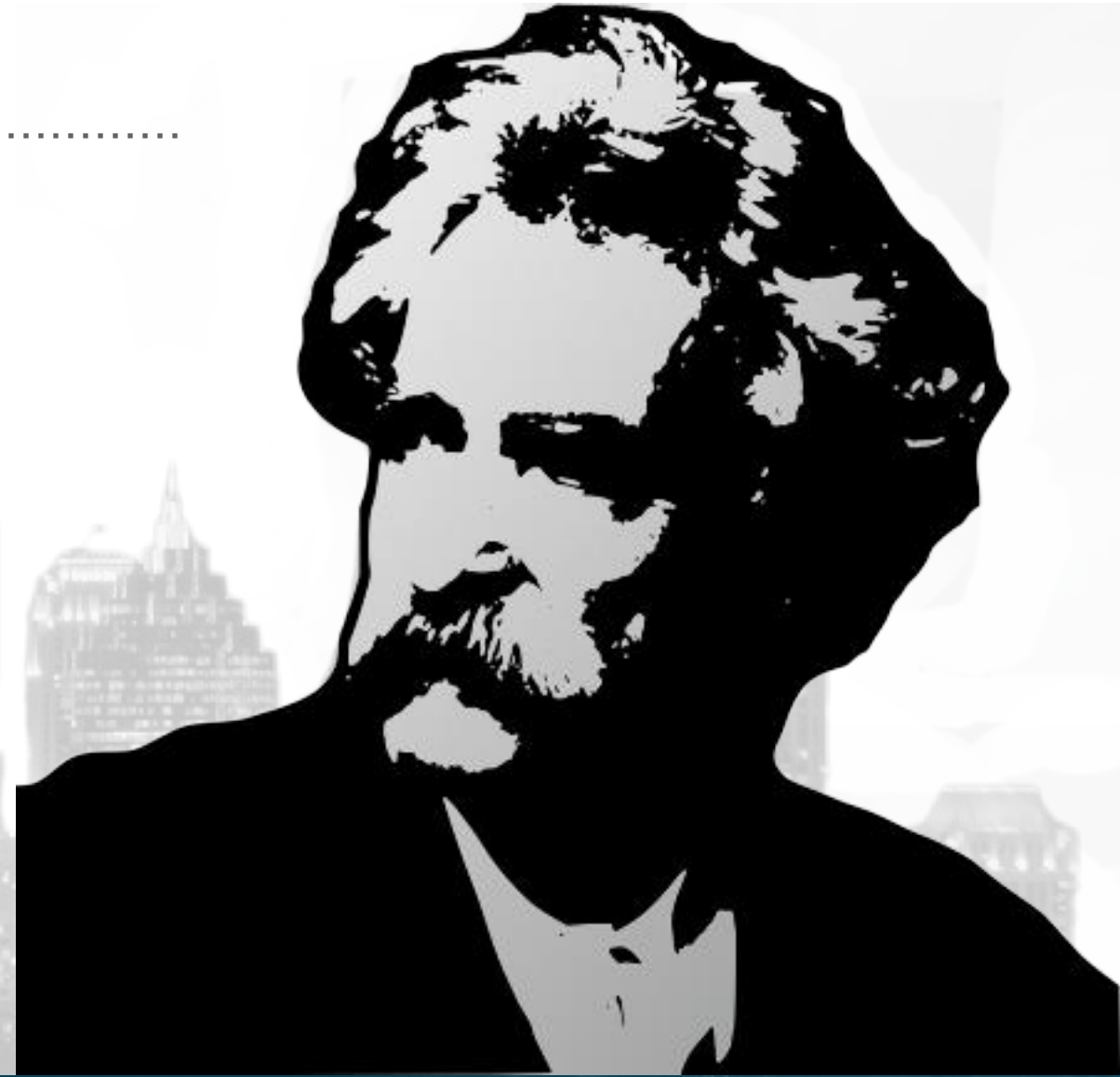
One Bad Bid

...what he missed was just how many times the roof had been resurfaced over the years with layers of tar and gravel, all hidden below the surface.

Leveraging Uncertainty

– *Mark Twain*

Expressing certainty about something you have no rights to be certain about.

What is this estimation thing?

...making commitments against hazy business objectives and obviously changing scope.

Expert Opinion

...what starts out with the best of intentions ends up being a target, often unrealistic expectations, as assumptions crumble in the face of implementation.

Assumptions in discrete value estimates

...we substitute uncertainty with assumptions on what they might turn out to be.

Range estimates

...a range estimate allows you to quantify what you're uncertain about.

A better way to express uncertainty.

...make your uncertainty evident, leaving it exposed for ongoing, even iterative reevaluation.

3 ~ 30 Days

Michael Godeck

A concept of measurement:

An iterative process of reducing your uncertainty about something that matters.
– Douglas Hubbard

Having a clear conception of what estimation actually is, that's half the battle, right there.

A concept of measurement:

– Douglas Hubbard

...Uncertainty is reduced by obtaining new information by means of observations. When observations are quantitatively expressed, that constitutes a measurement.
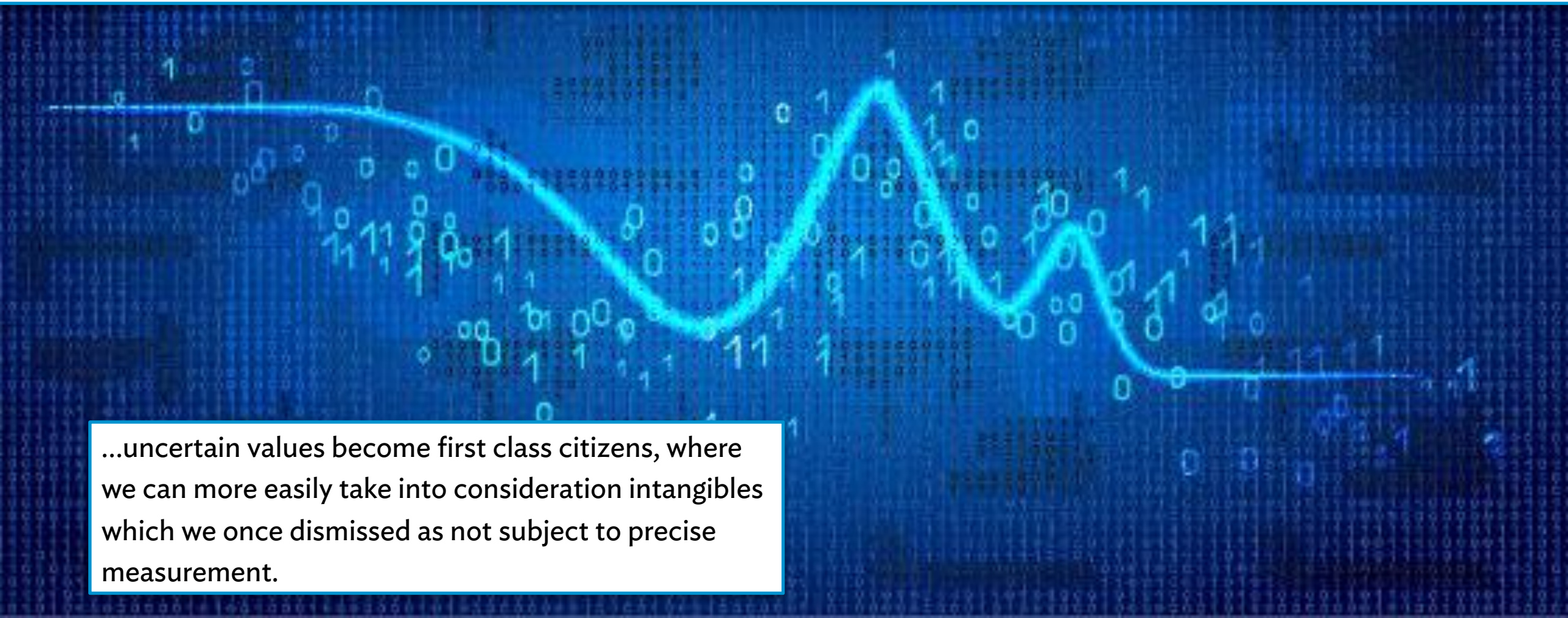
A Mathematical Theory of Communication

$$\lambda = \underset{\delta \to 0}{\text{Lim}} \, \underset{\epsilon \to 0}{\text{Lim}} \, \underset{T \to \infty}{\text{Lim}} \frac{\log N(\epsilon, \delta, T)}{T \log \epsilon}$$

...Shannon postulated that information is the amount of uncertainty reduction in a signal.

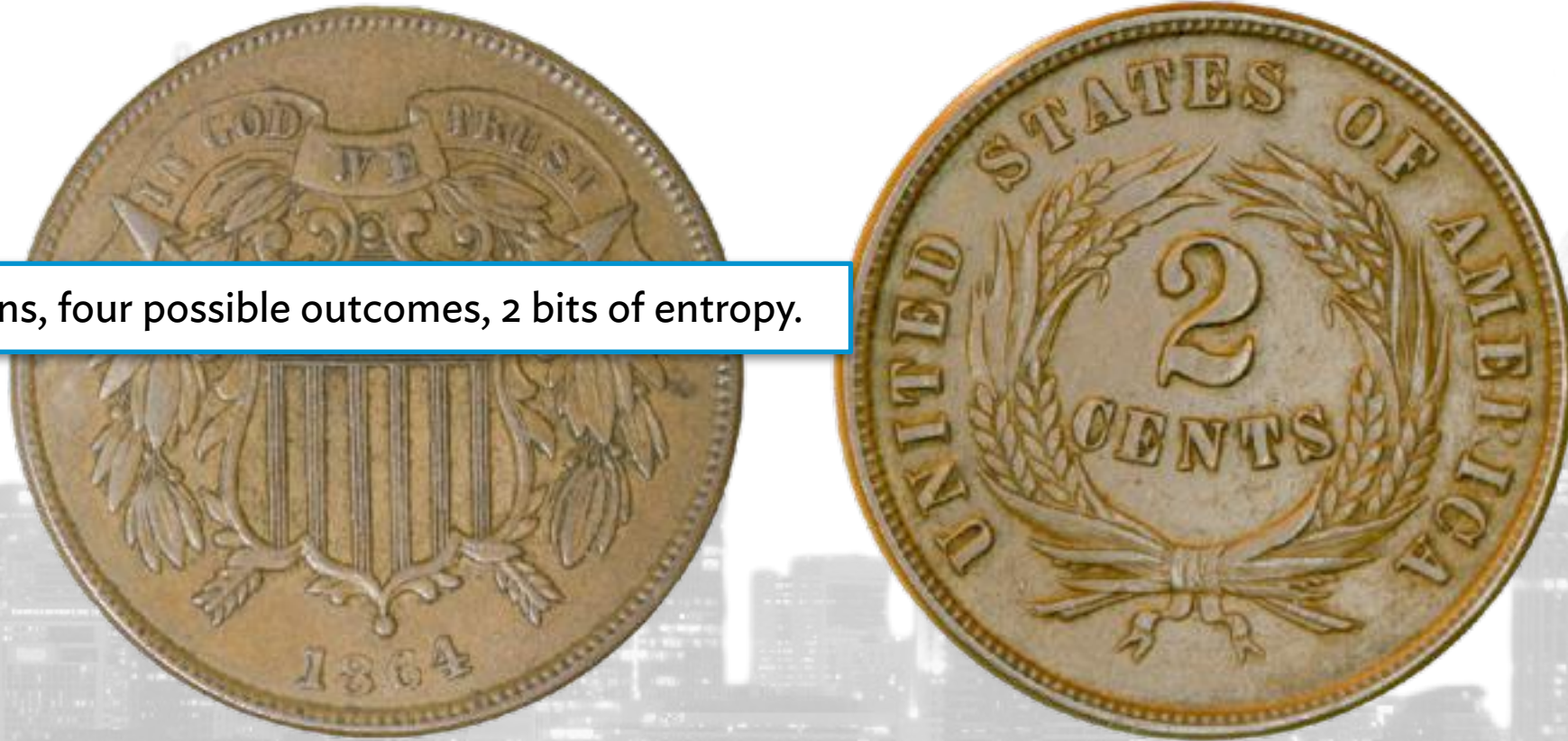# ...the amount of uncertainty reduction in a signal...

...uncertain values become first class citizens, where we can more easily take into consideration intangibles which we once dismissed as not subject to precise measurement.

Information Entropy

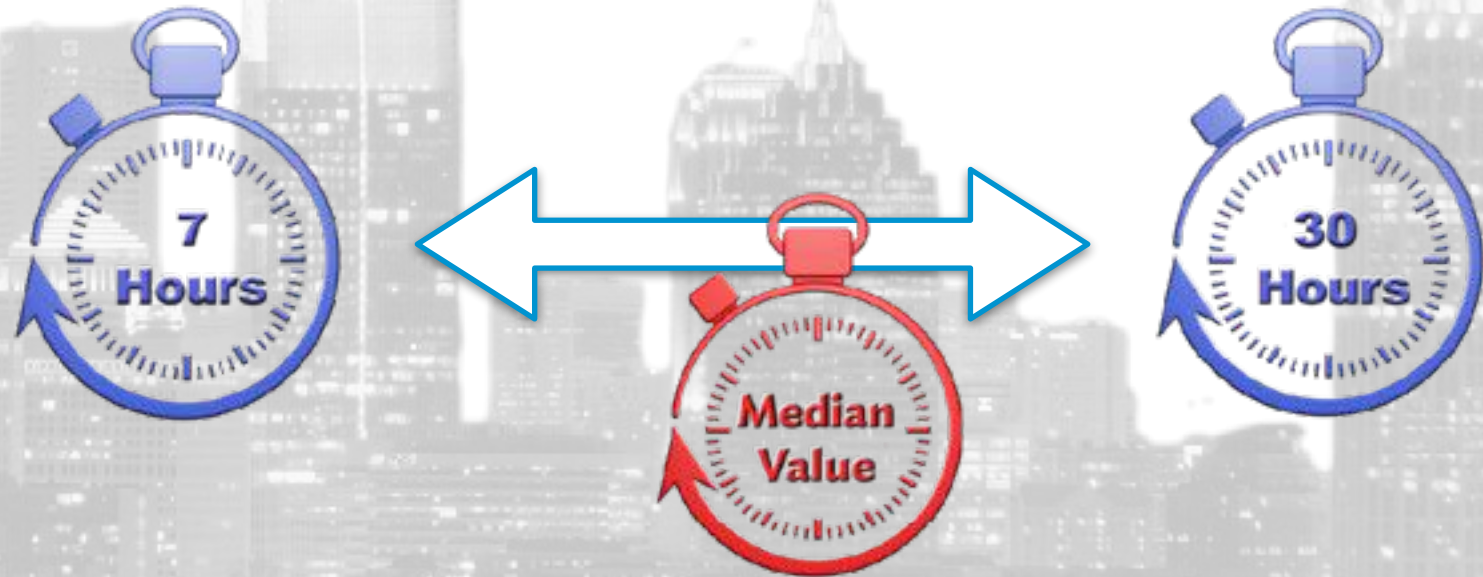...2 coins, four possible outcomes, 2 bits of entropy.
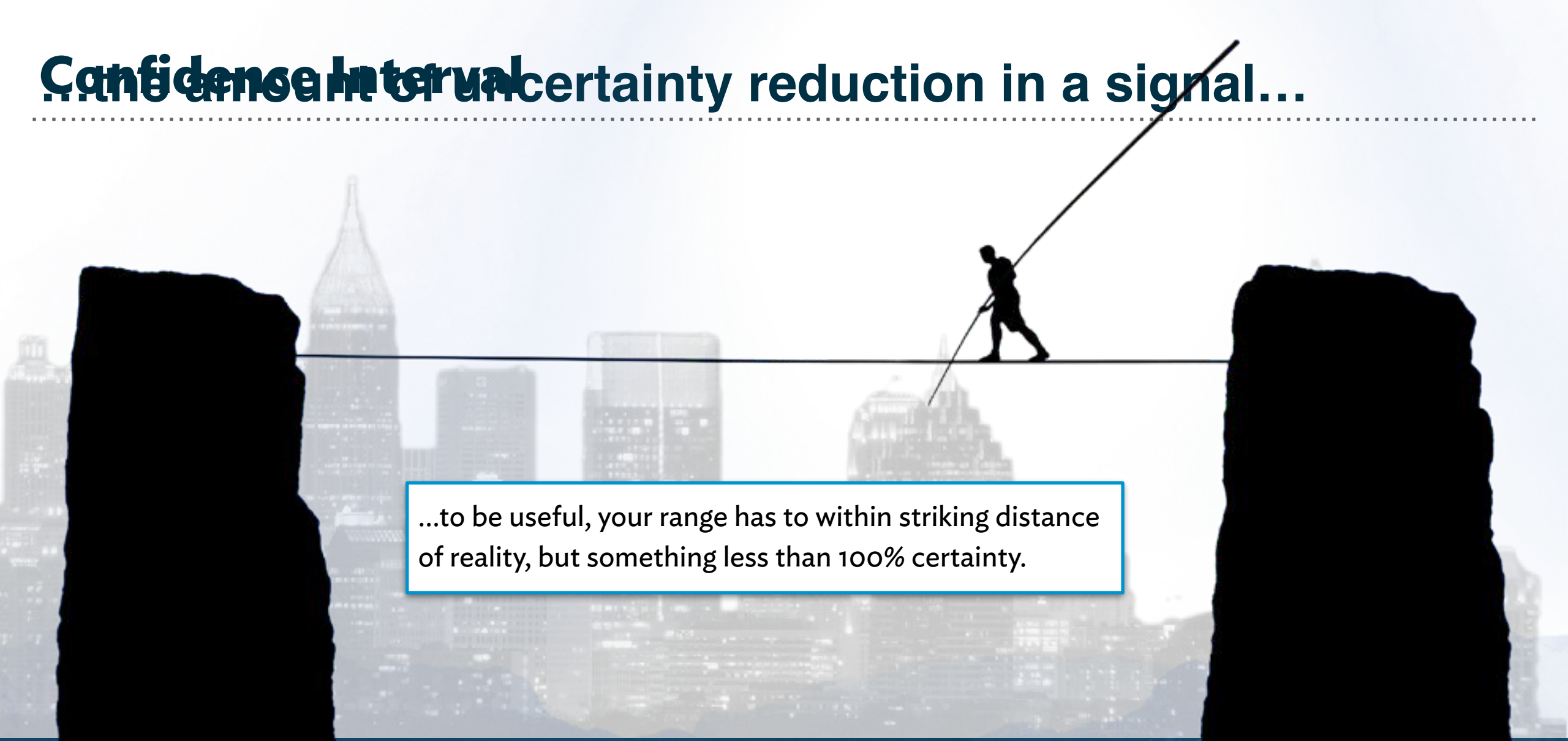
Information Entropy
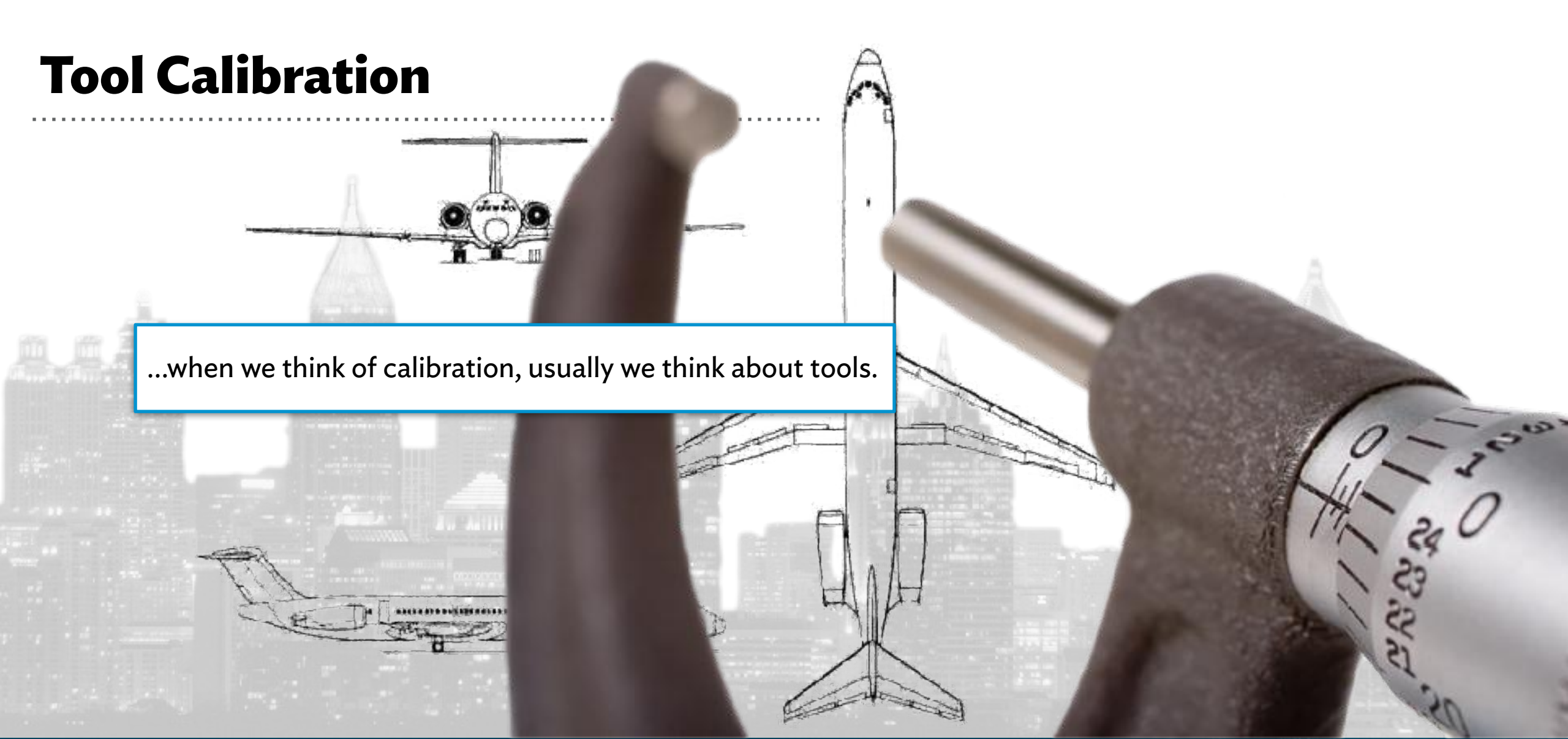
Information Entropy

Information Entropy

Confidence Interval

...the amount of uncertainty reduction in a signal...

...to be useful, your range has to within striking distance of reality, but something less than 100% certainty.

Michael Godeck

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Tool Calibration

...when we think of calibration, usually we think about tools.

Tool Calibration

...Calibration is a procedure where you measure against a known quantity, to that when applied against an unknown, you can have confidence in the observation.

Eliminating Bias

...Bookies and insurance actuarials learn to reign in overconfidence.

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Measuring against a known quantity

...Estimation calibration relies on arbitrary questions as known quantities to identify over and under confidence.

Measurement Methods

...There a many ways to measure things besides time and money. Knowing how different scales work, and how to use them is important to effective estimation.

Stanley Smith Stevens

Nominal Scale
Ordinal Scale
Rational Scale
Interval Scale
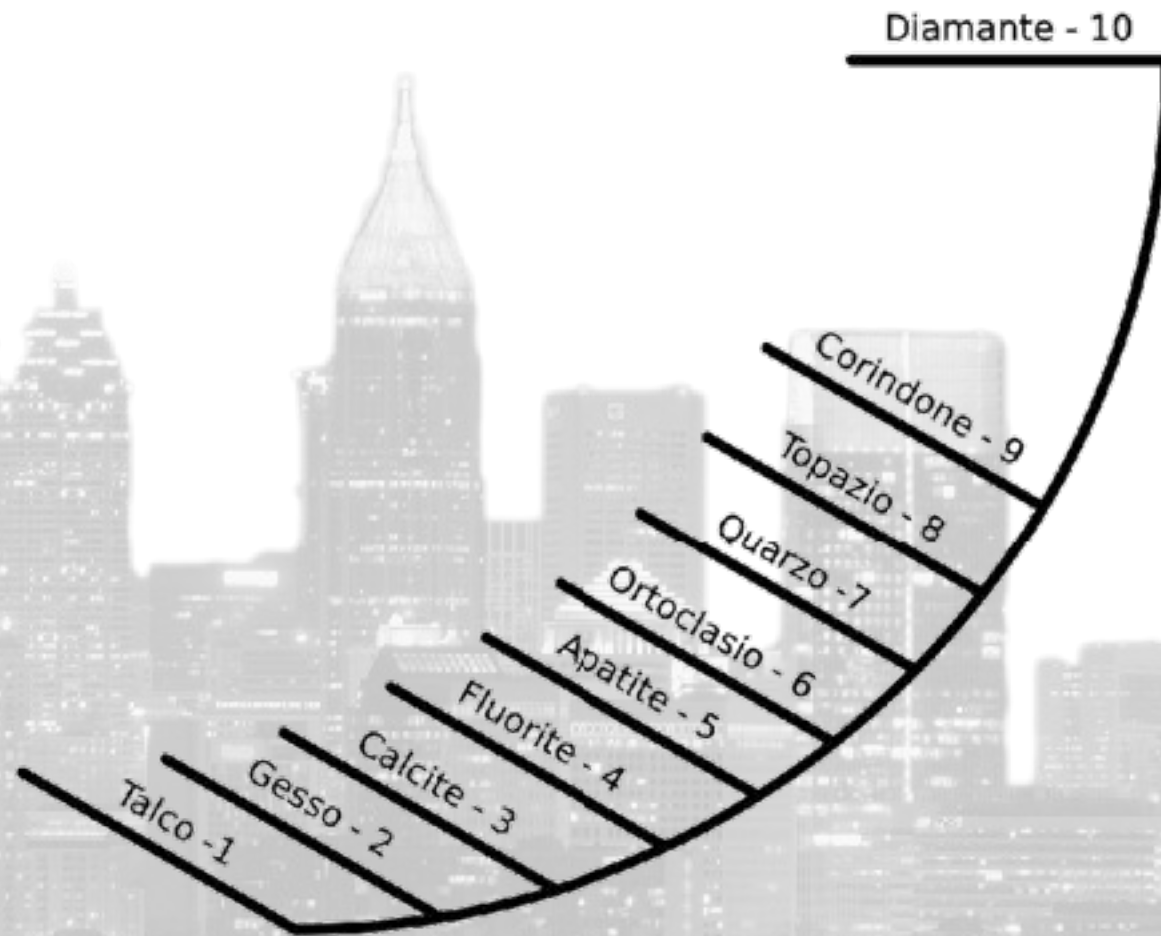
Rational Scales: Time and Money

Interval Scales: Story Points

An arbitrary baseline is established each time the scale is used, so comparisons become meaningless and velocity calculations can be easily gamed.

Ordinal Scales - Mohs Scale of Mineral Hardness

Diamante - 10
Corindone - 9
Topazio - 8
Quarzo - 7
Ortoclasio - 6
Apatite - 5
Fluorite - 4
Calcite - 3
Gesso - 2
Talco -1

Ordinal Scales - 5 Start Rating

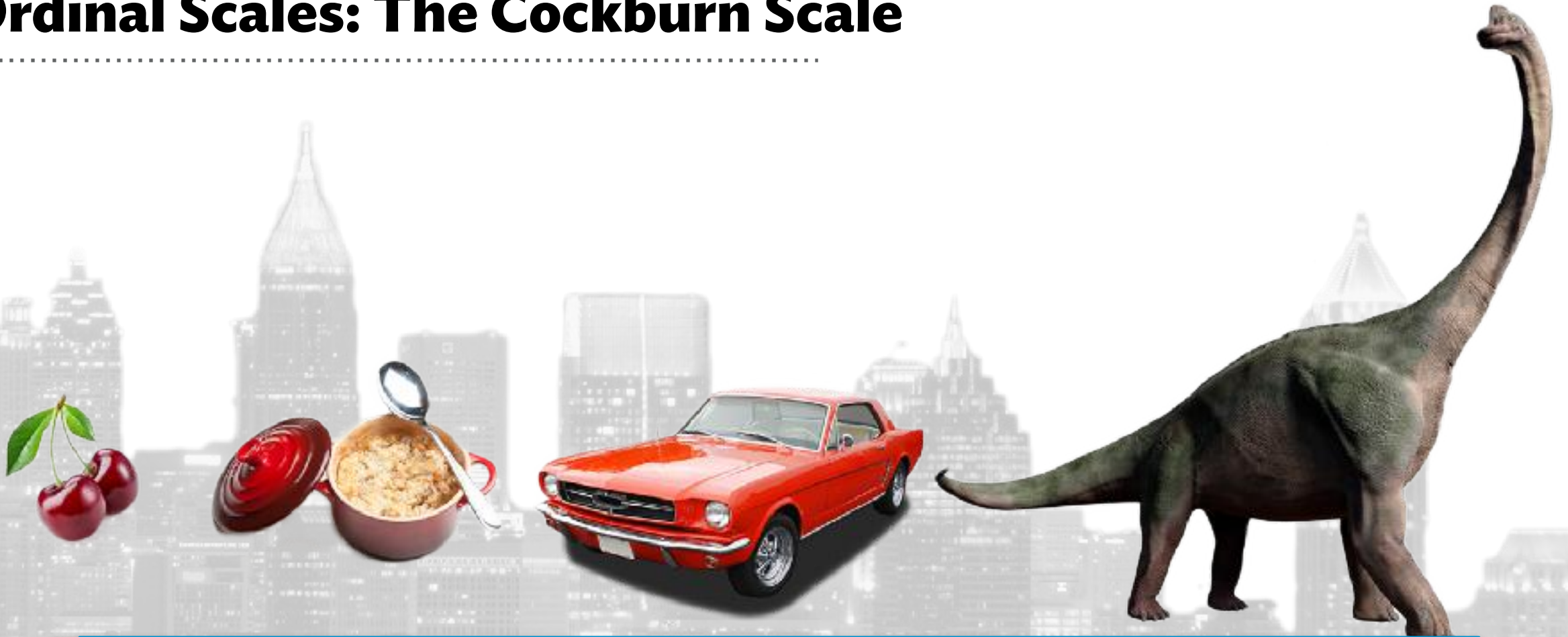A five one star movies as good as one five star movie?

Conflating ordinal and rational scales

Mixing up measurement scales increases ambiguity, when it's supposed to be reducing it.

Ordinal Scales: The Cockburn Scale

A brontosaurs is any story that's too big to go into work. It doesn't matter how much bigger on brontosaurs is from another, because both need decomposition before technical planning can be meaningful.

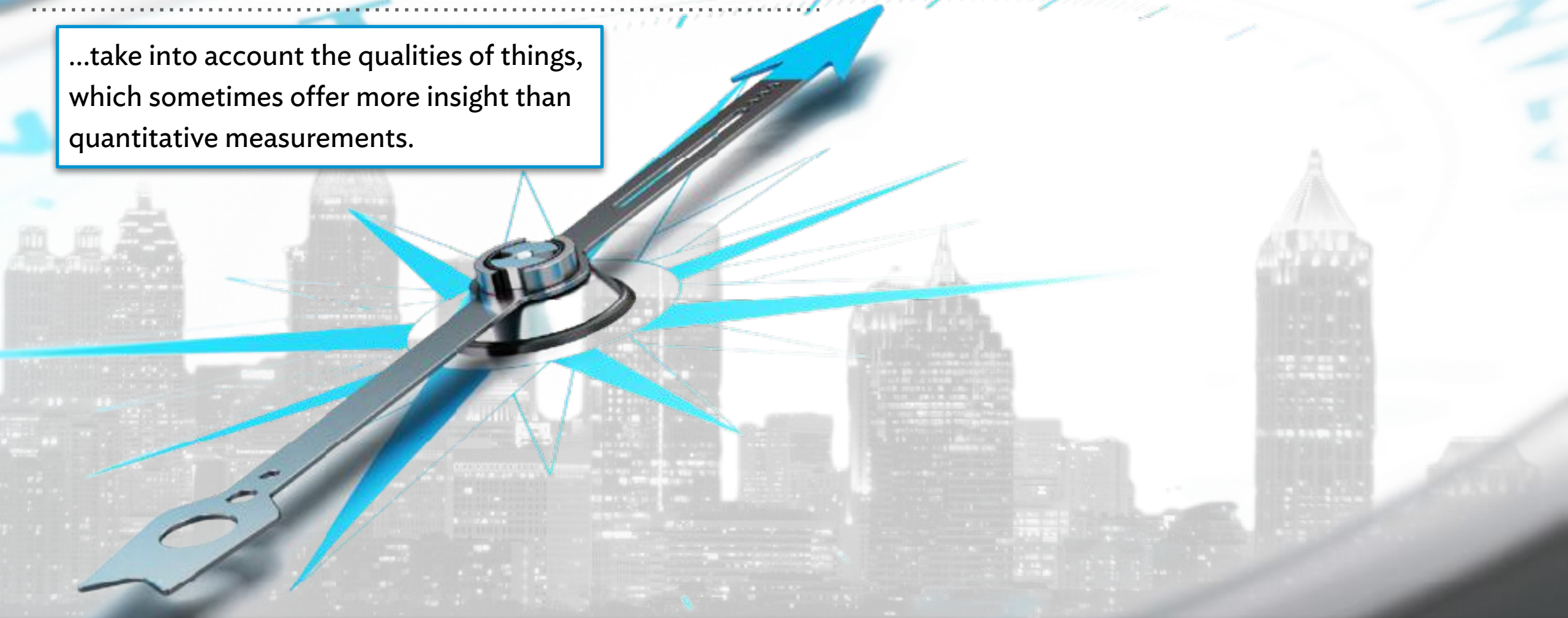# Ordinal Scales: OWASP Risk Scale

For sizing security risks, it definitely matters how much bigger one Tyrannosaurus Rex is from another; thus, ordinal is a poor choice of scale for this purpose.

Nominal Scales

...take into account the qualities of things, which sometimes offer more insight than quantitative measurements.

Quantify your uncertainty

...quantifying our uncertainty about qualitative questions helps us better understand just what we're uncertain about
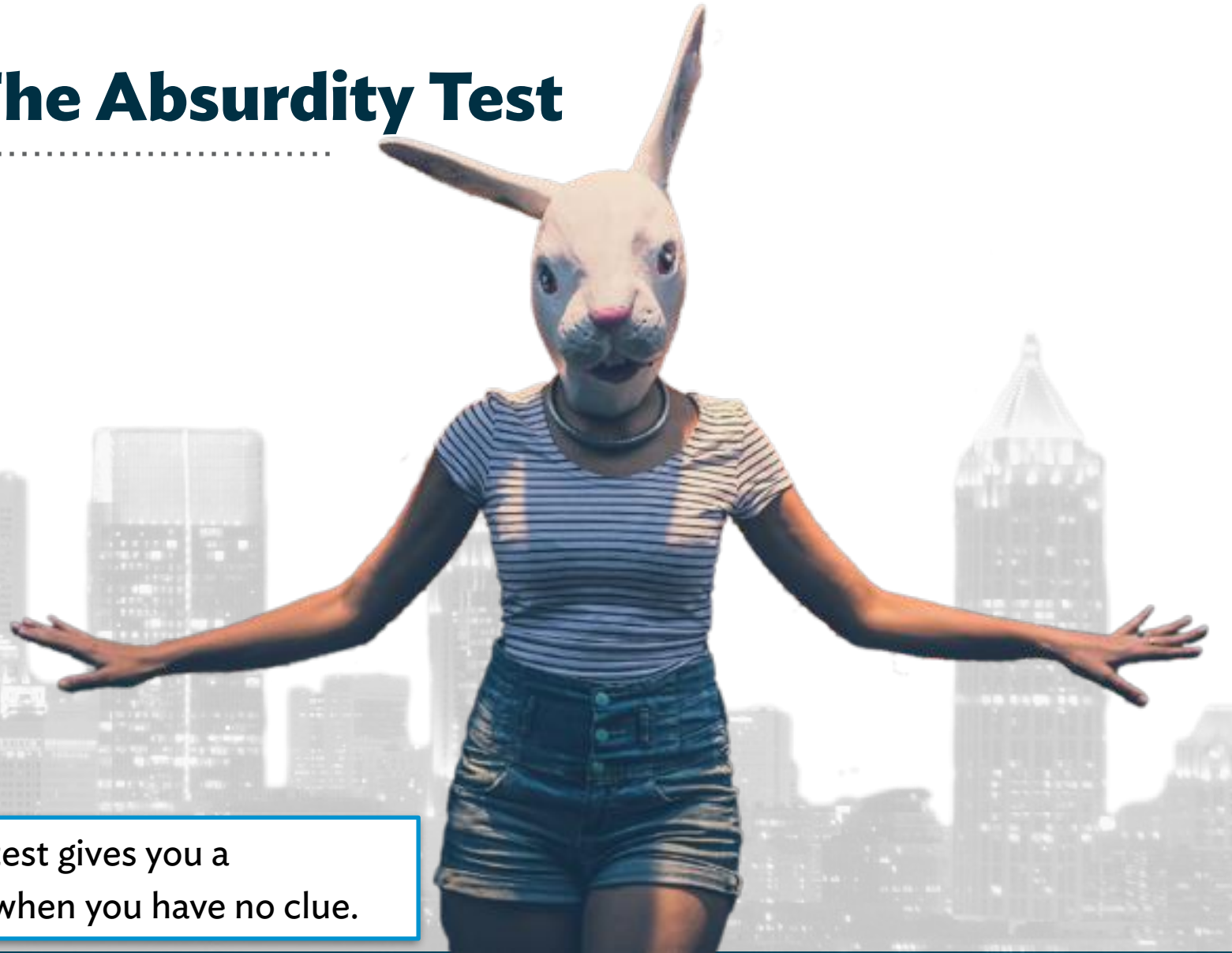
	A	B	C
1	Story: PRJ-1246 - Implement API Error Handling		
2		T/F	% Confidence
3	**Independent**	F	80
4	**Negociable**	T	90
5	**Valuable**	T	100
6	**Estimable**	T	60
7	**Small**	T	90
8	**Testable**	T	70

Range Validation: The Absurdity Test

3~300 Days

The absurdity test gives you a starting point, when you have no clue.

Range Validation: Imagine you are wrong.

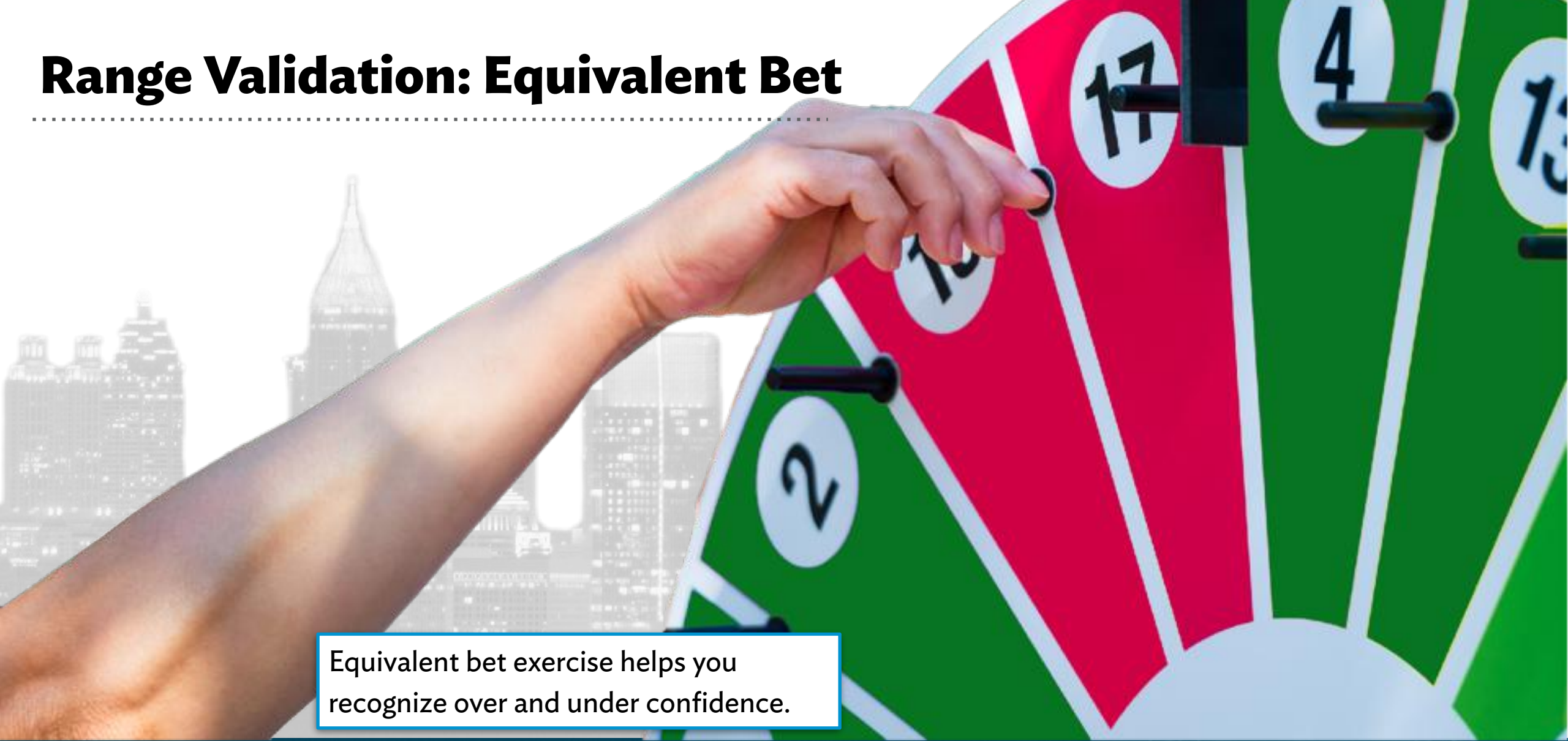Imagine you're wrong exercise helps you better understand the work.

Range Validation: Mid-point Anchoring

Mid-point anchoring exercise helps you eliminate bias.

1 Day

3 Days

Range Validation: Equivalent Bet

Equivalent bet exercise helps you recognize over and under confidence.

Range Validation: Arbitrage

4 ~ 6 Hours

The arbitrage exercise helps you better understand 90% confidence interval.

Michael Godeck

"Information is the resolution of uncertainty"

– Claud Shannon

- Range estimates help us quantity uncertainty.
- Range and probability replace the need for assumptions.
- Decomposition is a form of estimation.
- Understanding measurement scales is important to estimation.
- Range validation exercises help pressure test estimates.
- Estimation calibration helps up understand how to reflect our uncertainty.
- 90% confidence interval keeps up focused on meaningful estimates.
- The greater uncertainty, the easier to reduce it.
- The only estimates that have value are those the affect decisions we face.

Diving Deeper…

This session developed the concept, object and methods of estimation, with a focus on range estimation and confidence intervals.
Companion sessions that build on this foundation are:

- "Estimation for Release Planning: understanding the impact of queue time on when work will really be done."

- "Monte Carlo Simulations for project estimation: range estimating techniques for complex scenarios such as project planning."

- "Story Decomposition: right-size your stories and the world is your oyster."
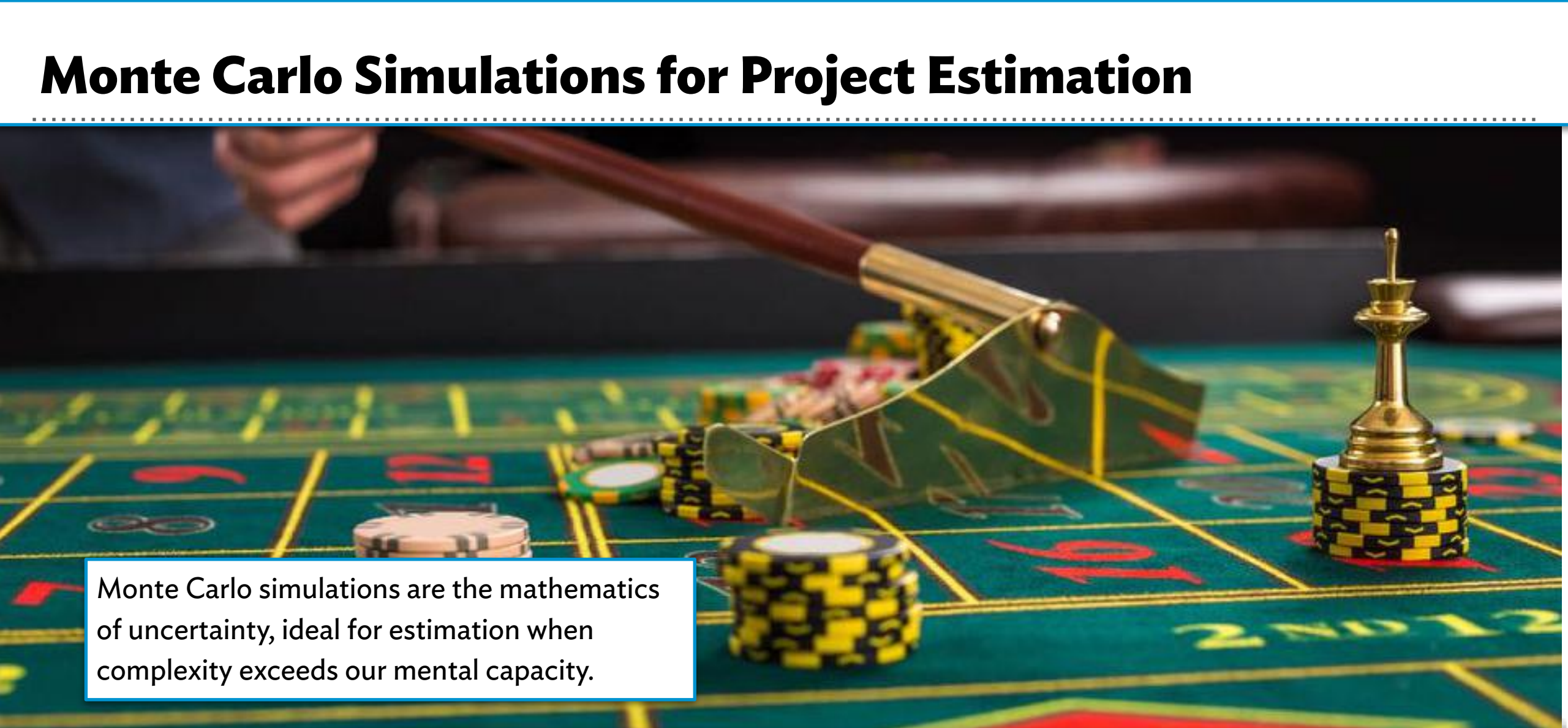
Release Planning and Queue Time

"Predictability builds and holds trust, a core Agile value, better than does delivering more with less reliability."

Predicting when work will be done depends as much on understanding queue time in your process, as it does on developer effort-estimation.

Understanding queue time depends on reasoning about different problems then effort estimation.

# Monte Carlo Simulations for Project Estimation

Monte Carlo simulations are the mathematics of uncertainty, ideal for estimation when complexity exceeds our mental capacity.
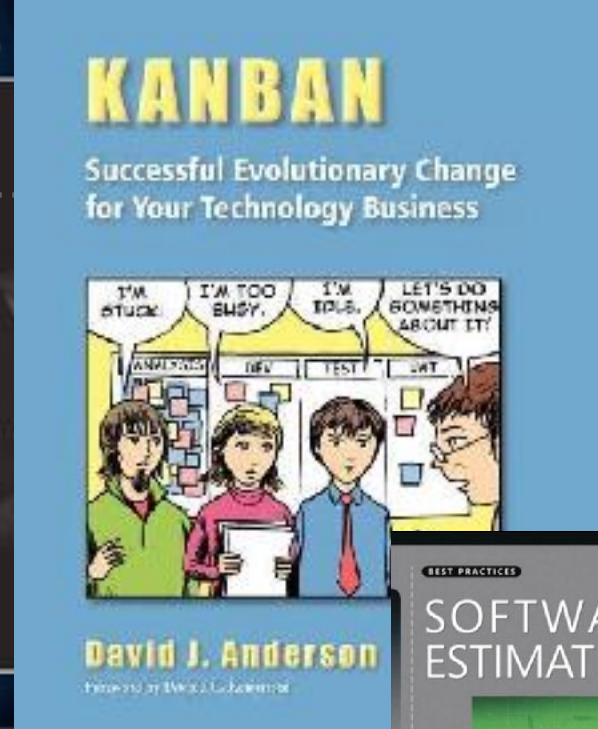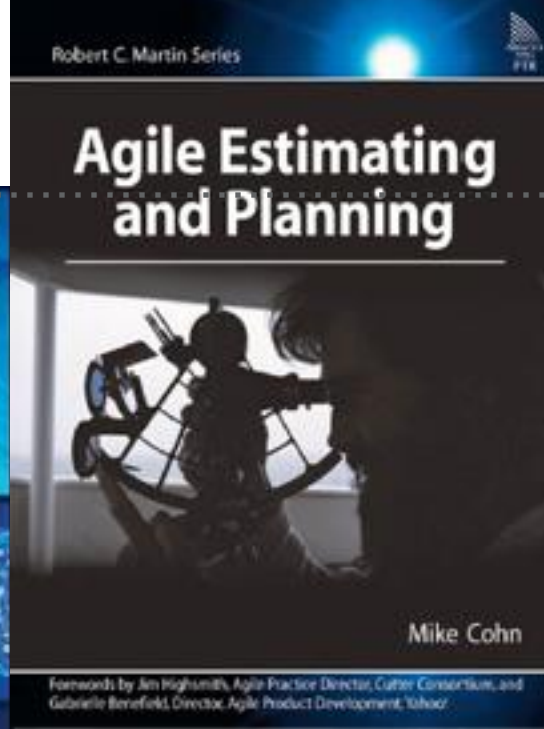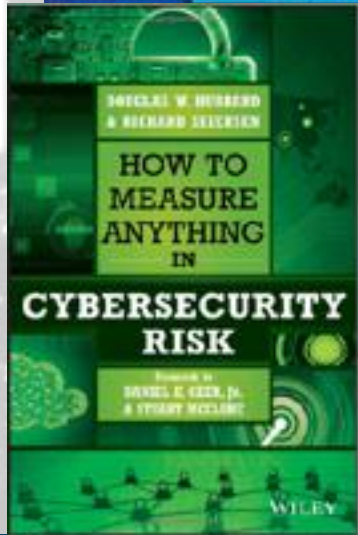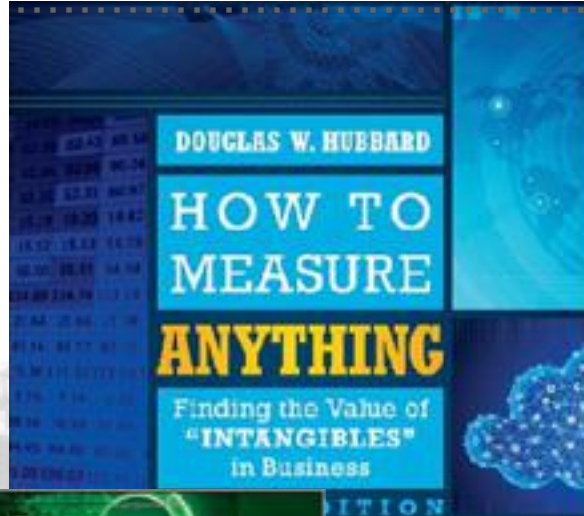
Story Decomposition

Right sizing stories is half the battle.

It's become popular to say that a good team doesn't need estimation if they get story size right. That misses the point the right-sizing stories is estimation, and it's as easy to get wrong as any other kind of estimation.
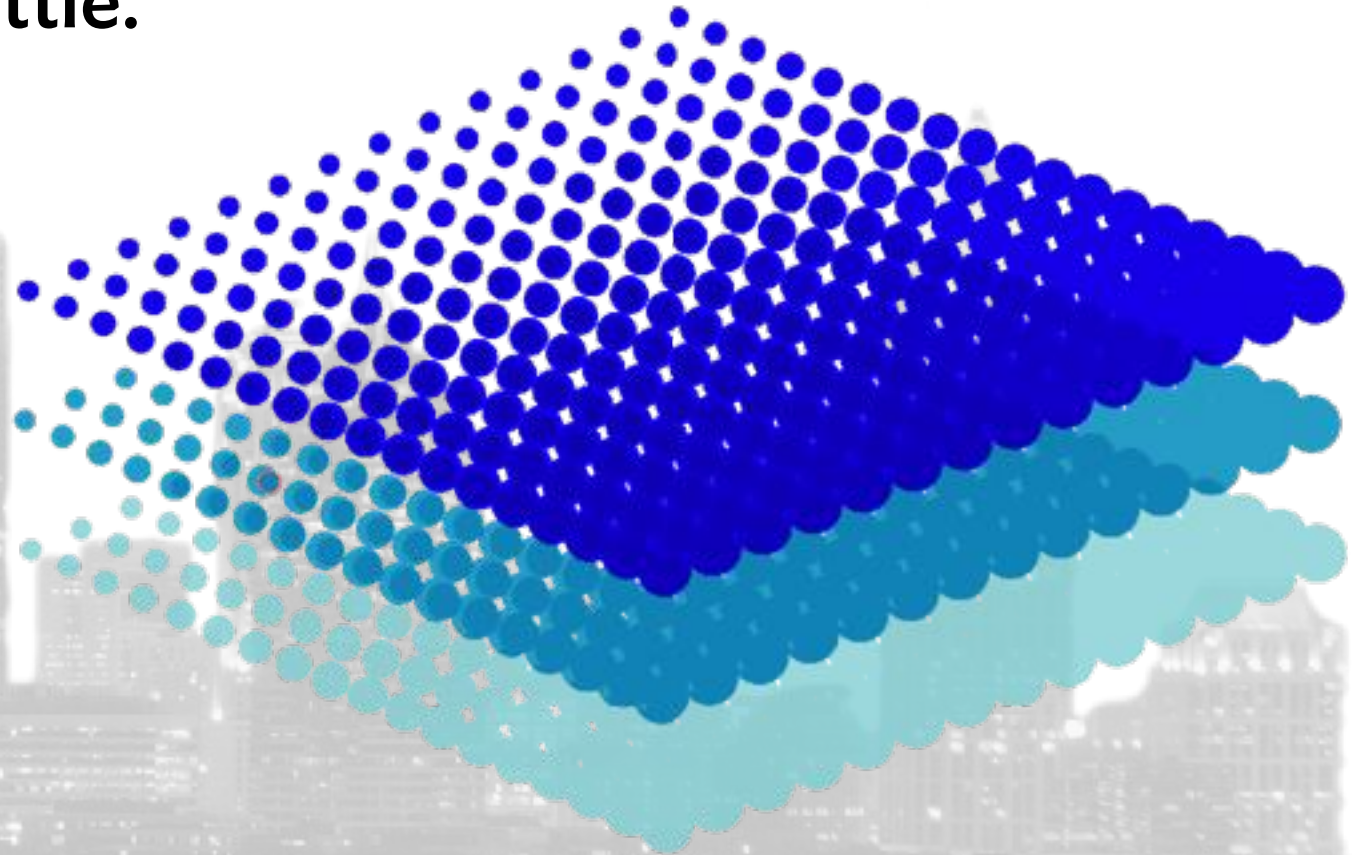
Bibliography

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