

# Metric Perversity & Very Bad Decisions



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# What is a metric?

- Quantifiable measurement to figure out whether you're doing well or not at a particular thing
  - Goal metrics measure whether you're hitting your goals
  - Program metrics measure progress on planned work

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- Quantifiable measurement to figure out whether you're doing well or not at a particular thing
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# What is a *perverse metric*?

- A metric which doesn't tell you what you think it's telling you
  - ... and then you make bad decisions
- This especially often impacts privacy, security, and trust&safety
  - Adversaries
  - Unknowns
  - Small risks with critical impacts

# Types of metric perversity

- **Measuring effort, not results**
- **Just because you can measure something doesn't mean it's important**
- **Using a gauge as a lever**
- **Adversaries don't help you measure**
- **Small number times big number is useless number**
- **You didn't measure the black swans**

## How to avoid it

# Measuring effort, not results

- People want to show how hard they're working
- Unfortunately, effort  $\neq$  results
- Real example:

**“Send N notifications this quarter”**

- I could hit that goal tomorrow. Whoever set it wouldn't enjoy the results.
- Don't confuse activity for progress

# Just because you can measure something doesn't mean it's important

- People pay a lot of attention to metrics
  - ... for good and bad
- Real example:
  - Privacy review team was told they were slowing down launches too much
  - So they wanted to go faster
  - So they measured *time to first response*
  - ... so the first responses became (often) useless, but very fast
  - *Not* measuring directly led to better results
- Direct attention where you *want* it.

# Using a gauge as a lever

- Gauges indicate a system is working well. Indirectly.
- It's often impossible to measure in practice without a gap.
- Real example: connections in social networks
  - Connections between people are an *indication* that the product is successful
  - ... but not all connections are good:
    - Publicity
    - Access controls
    - Harassment
- You broke your indicator *and* (maybe) your product
- Don't use a gauge as a lever.



# Adversaries don't help you measure

- Adversaries are adversarial
  - ... even if they're not trying to be adversaries
- Real example:
  - Incident/vulnerability statistics
  - Often driven in large part by employee and external reports
  - Easiest way to drive down your stats: discourage people from reporting
- Your metrics can only be as good as your data. Even if it's manipulated.

# Small number x big number = useless number

- Estimates are estimates and have uncertainty.
- Many of the estimates we use in privacy/security/T&S have so much uncertainty that they're useless
- Example:
  - Estimated amount of monetary risk you're taking by delaying the fix of an issue =  $p \times I$
  - $p$  = the risk of issue happening, taking all protections and user behaviours into account
  - $I$  = impact of the issue, taking into account the direct breakage, indirect breakage, emergency fixes on other issues, upgrades, consultants, many lawyers, potentially regulatory inquiries, FTC consent decrees, changed practices in the future... and user/customer trust
  - There is so much uncertainty that the number is useless
- Watch your uncertainty!

# You didn't measure the black swans

- You only measure the things you think to measure. And not all of those.
- Black swan: unanticipated event with major impact
  - They show up more often and have more impact than you'd think
- Measuring black swans has all of the problems
  - Measuring the impact of unlikely risks in general
  - Plus the problems of trying to measure specifically risks that you don't know about
- Example: Gamergate, Rowhammer
- You don't know how wrong you are, but you know that you are.

**Avoiding metric  
perversity**

# Techniques

- The Jerk Genie
  - All-powerful, extremely literal
  - They will make your metric dreams come true in the worst way possible
  - Think about how they will mess up every single one of your metrics
- Guard metrics
  - If you need to use a perverse metric (e.g. a gauge as a lever), set up a guard
  - For example: check some sample of traffic to see if it's “bad”, test product quality out of band
- Wrong metrics are worse than no metrics
  - Check your level of uncertainty
  - If your data can be manipulated, so can your metrics
- Be opinionated
  - What should looking at your metric make someone *do*?

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