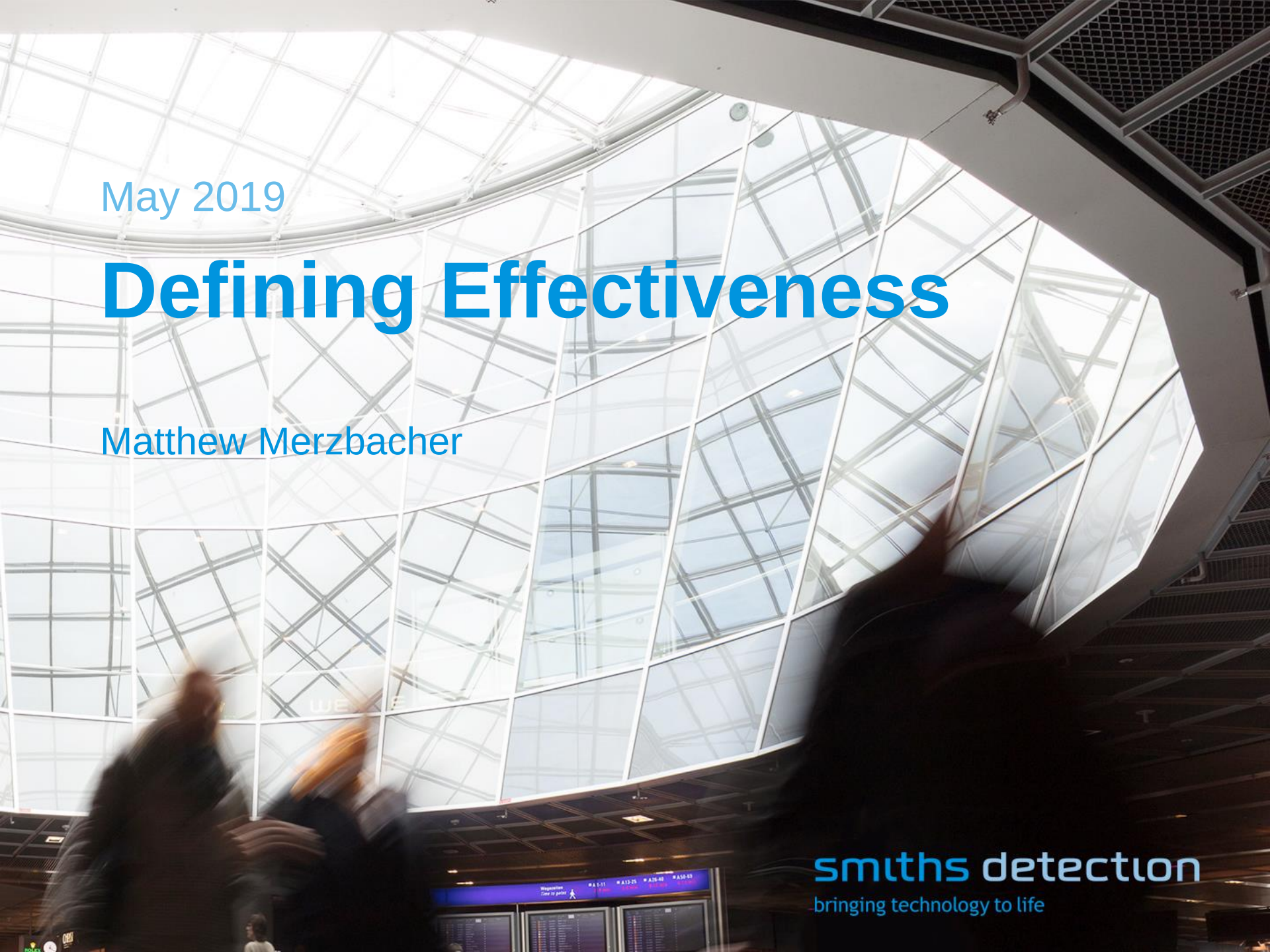


May 2019

Defining Effectiveness

Matthew Merzbacher

smiths detection

bringing technology to life

Carl Asked…

- What makes TSE effective?
- What is your definition of effective?
- What can be done to make TSE more effective?
- How to balance the needs of the stakeholders (TSA, airports, airlines, passengers)? What if their definitions of effectiveness conflict?
- Is hardened TSE causing terrorists to attack soft targets (e.g., baggage claim, ticket counters, rail, and subway)?
- How to protect soft targets?
- How to deal with an adaptive adversary?
- What is the role of deterrence?
- How to handle perceived biases (profiling) that arise at the checkpoint? See for example: TSA Agents Say They're Not Discriminating Against Black Women, But Their Body Scanners Might Be: link
- What potential problems need solutions with the use of checkpoint CT?
- What happens if PFA from the ATR is too high?
- What is the impact of hypothetical low statistical relevance of equipment testing?

SWWC – Defining Effectiveness

- Is TSE Effective?

  To locate icebergs, use multiple radars and the iceberg-monitoring charts provided by the International Ice Patrol and governments with jurisdiction in polar regions. Always have at least one person with binoculars on the lookout, too.
  https://www.nytimes.com/2017/04/21/magazine/how-to-avoid-icebergs.html
- The **best** way to avoid an iceberg is **not** an “iceberg detection system”
  - That does not make an IDS a bad idea, just not the best
  - IDS is the last line of a multi-layer strategy
  - Similarly, TSE is the last line of a multi-layer strategy
- In a multi-layer strategy
  - What do we mean by best? How do we recognize better?
  - Where/how should we focus our improvement efforts?
- Do adversarial icebergs change the game?

Motivational Quote du Jour

- Is the goal of TSE to stop attacks?

  Pavela compares **it** to airport security. Safety relies on a combination of ID checks, no-fly lists, metal detectors, and X-rays, and see-something-say-something vigilance. You don't just tell people not to bring a bomb on a plane.

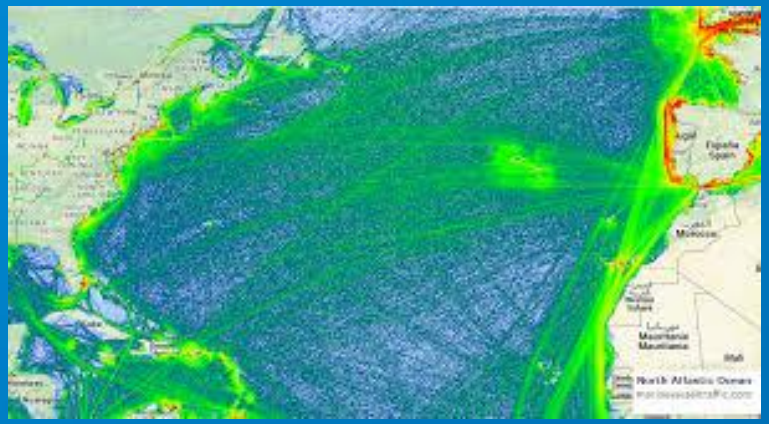
- In the above, **it** refers to:
  https://www.lamag.com/citythinkblog/ucla-cheating/

- How do we measure system effectiveness?
- Can we learn from other domains?

What is (and isn't) Effectiveness

- Produce desired result/outcome/changes to target, as measured by:
  - Accuracy
  - Completeness
- Efficiency is not absolutely required for effectiveness
  - Clearly is part of the overall utility function
  - What about economy/cost?

    To avoid icebergs, stay out of the North Atlantic



Rule for achieving effective systems

- Say what you mean, mean what you say
  - What you say you need
  - What you think you need
  - What you actually need

- Measure and know the metric
- Evaluate Evaluate Evaluate!

A parable about effective metrics

- Gaming the System
  - Counter to Dumping: take “average” bid
  - Competitors used multiple bids to drive average and ensure win

Interactive Moment: What happened?

Disconnect between actual and stated need

Effective Effectiveness

- Who sets the goal?
  - Balancing stakeholder needs
  - May need proxy stakeholders
- What is the goal?
  - Component goals are not always the same as system goals
- How do we set/maintain goals?
  - Identify immutable rules
  - Build a utility function
  - Champion the goal
  - Scrutinize the goal
    - Be alert to unintended consequences
      - Displacement
      - Serendipity

Is TSE Effective?

- Multi-Layer fraud detection system
  - 90% of plots are given up early
  - 90% of remaining plots identified by intelligence
  - 90% of remaining plots chicken out on dry run (or in action)
  - 90% of remaining plots fail on technical basis
  - 1,000,000 original plots => 100 plots need detecting
- If detection is expensive (and cost of fraud is relatively low), then…

  Eliminating expensive “last mile” detection system seems obvious, but…
  - Funnel mouth will grow (more plots)
  - Abandonment percentage will fall
  - This is Adversarial Behavior
  - Net will be more need for detection and (maybe) more overall cost
- Must consider entire system, including humans

What needs to be done?

- Systems Analysis
- Systems Design
- Systems Dynamics
- Systems Engineering
- Systems Methodologies
- Systems Theories

- Systems Science!

Thank You