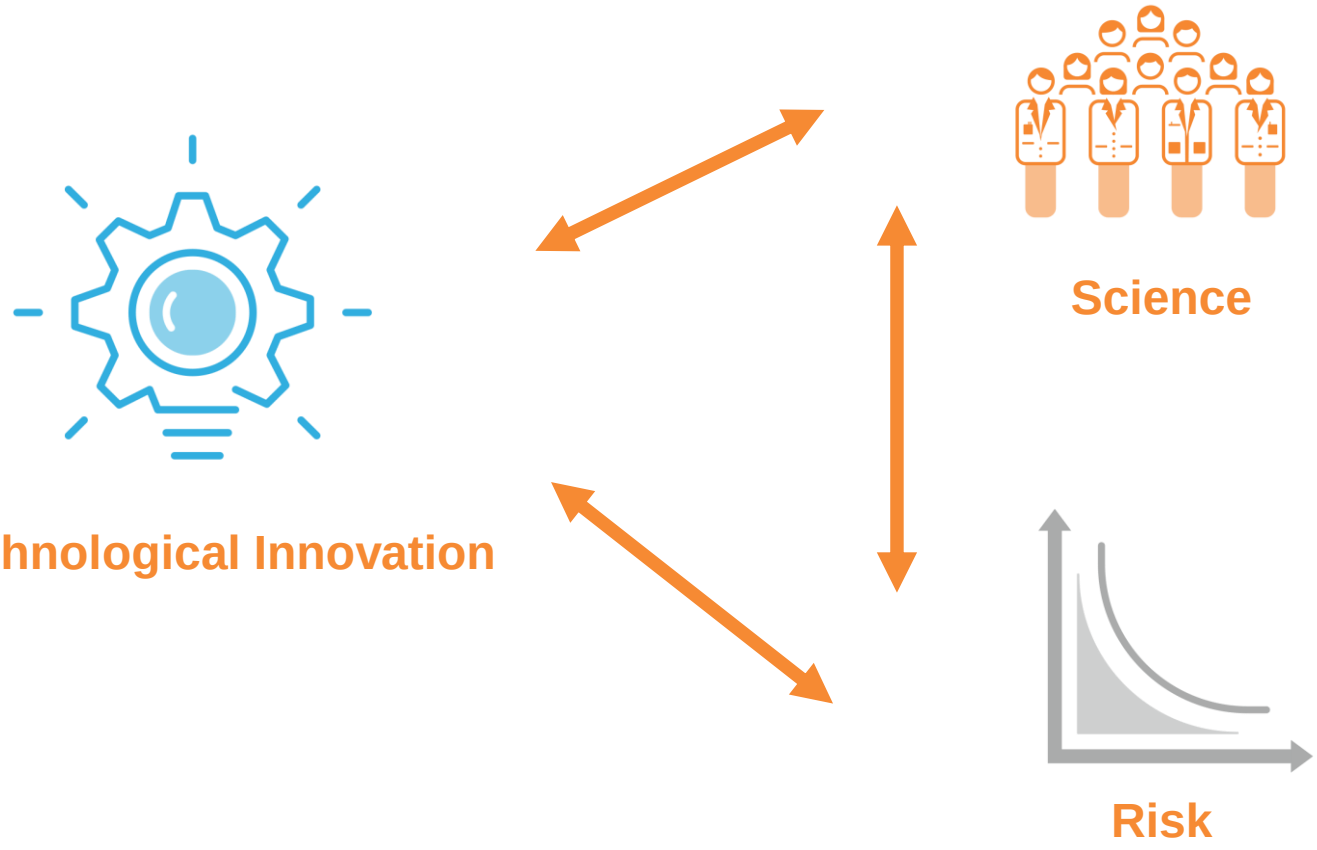
Praedicat®

WHY SCIENCE MATTERS TO CASUALTY ACTUARIES

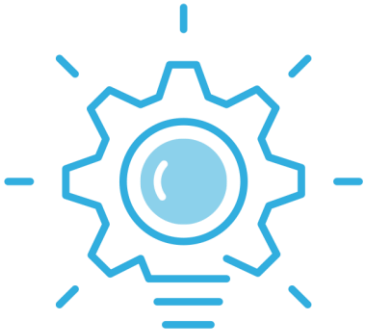
Modeling Liability Accumulation
Casualty Actuarial Society

September 20, 2016

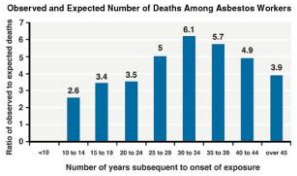
The risks of major technological innovation are not known in advance



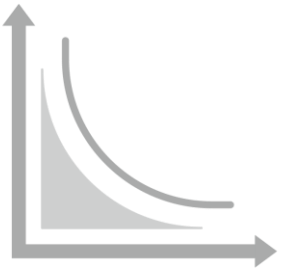
As the risks emerge, when aggregations are unmanaged, it can be catastrophic



Science



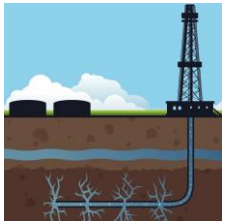
Technological Innovation

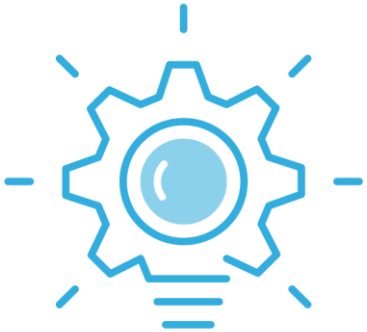


Risk

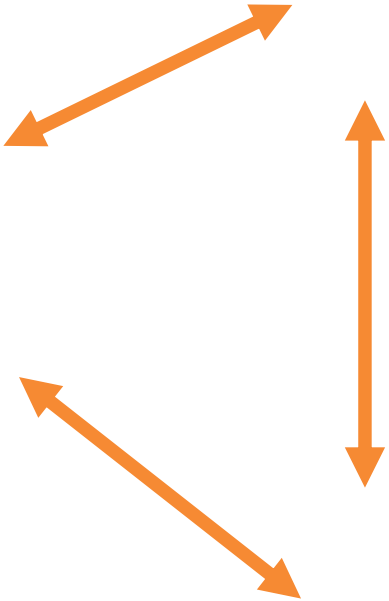
$85B

“Disruptive” technologies are emerging with increasing frequency

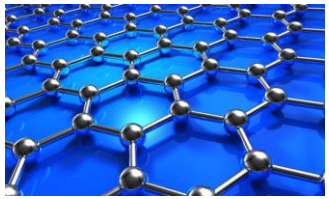


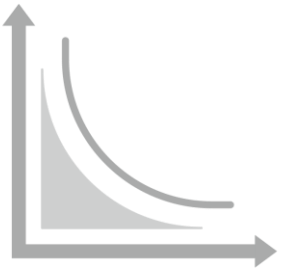


Science



Technological Innovation





Risk

Exclusions are not the answer

Quantifying casualty cat risk challenges traditional actuarial science

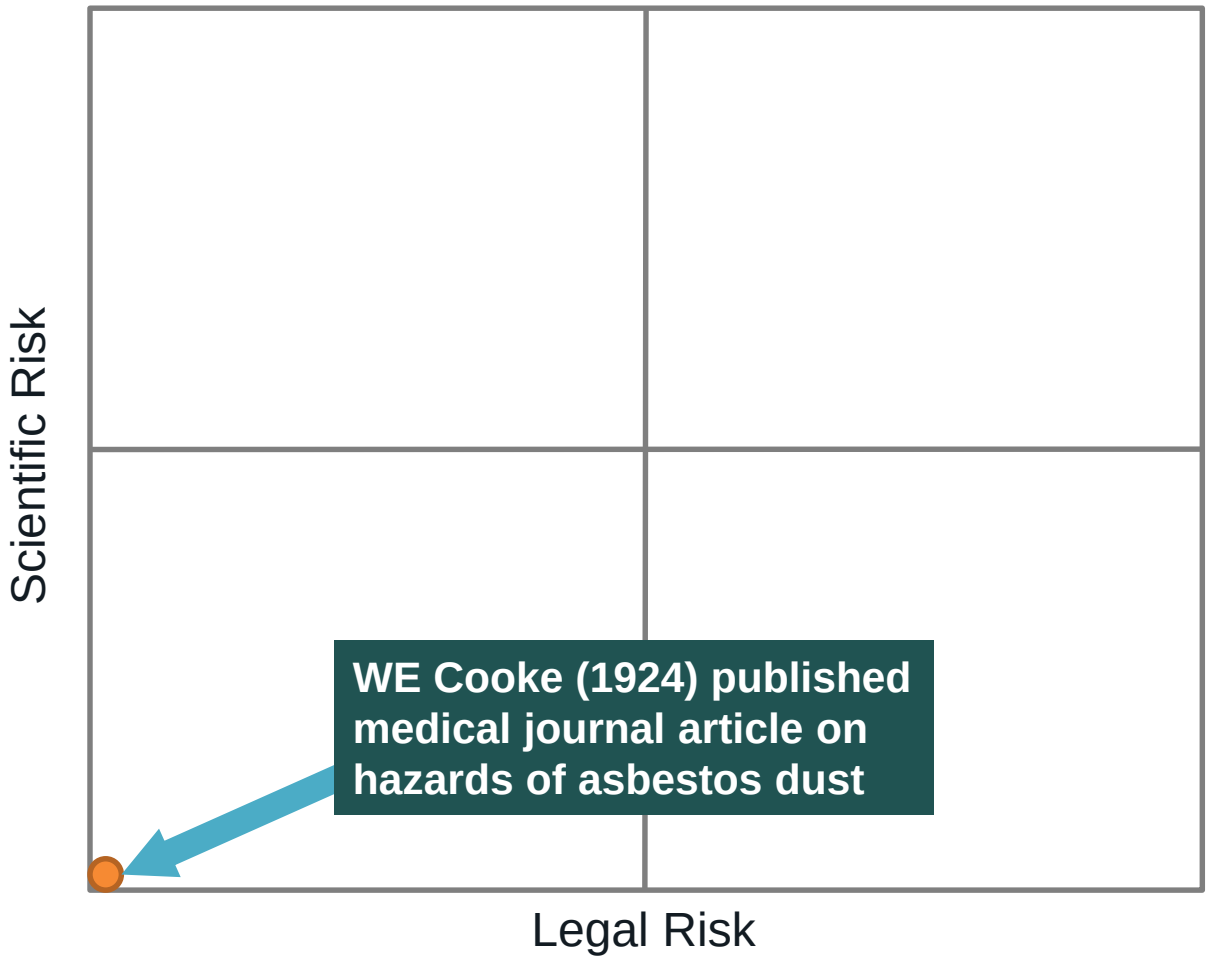
- Claims and experience are not predictive
  - Mass litigation creates a dynamic risk
  - Legal precedent and the rules of evidence are not well understood in the actuarial community
- Revenues are not a strong proxy for liability risk
  - Breast implants
  - Vaginal mesh
  - Asbestos
- Industrial classification is also a weak proxy
  - Exposures drive risk not SICs
  - Two companies in same industry may not make or use any of the same things

Is casualty cat risk currently being accounted for, reserved and priced accurately?

Liability accumulation management requires defining loss drivers and scale

- Science-based
  - Early warning for bodily injury litigation
  - Generally accepted science required for proving first element of bodily injury case: general causation
- Legal-based
  - Connecting exposure to defendant is a function of available defenses and can be modeled
  - Systemic changes and jurisdictional distinctions can also be scored
- Big data
  - Text-mining of peer-reviewed science to scale emerging risk identification
  - Tracking and forecasting science, connecting exposures to companies and industries possible with new technologies

Science and law evolved to enable asbestos litigation



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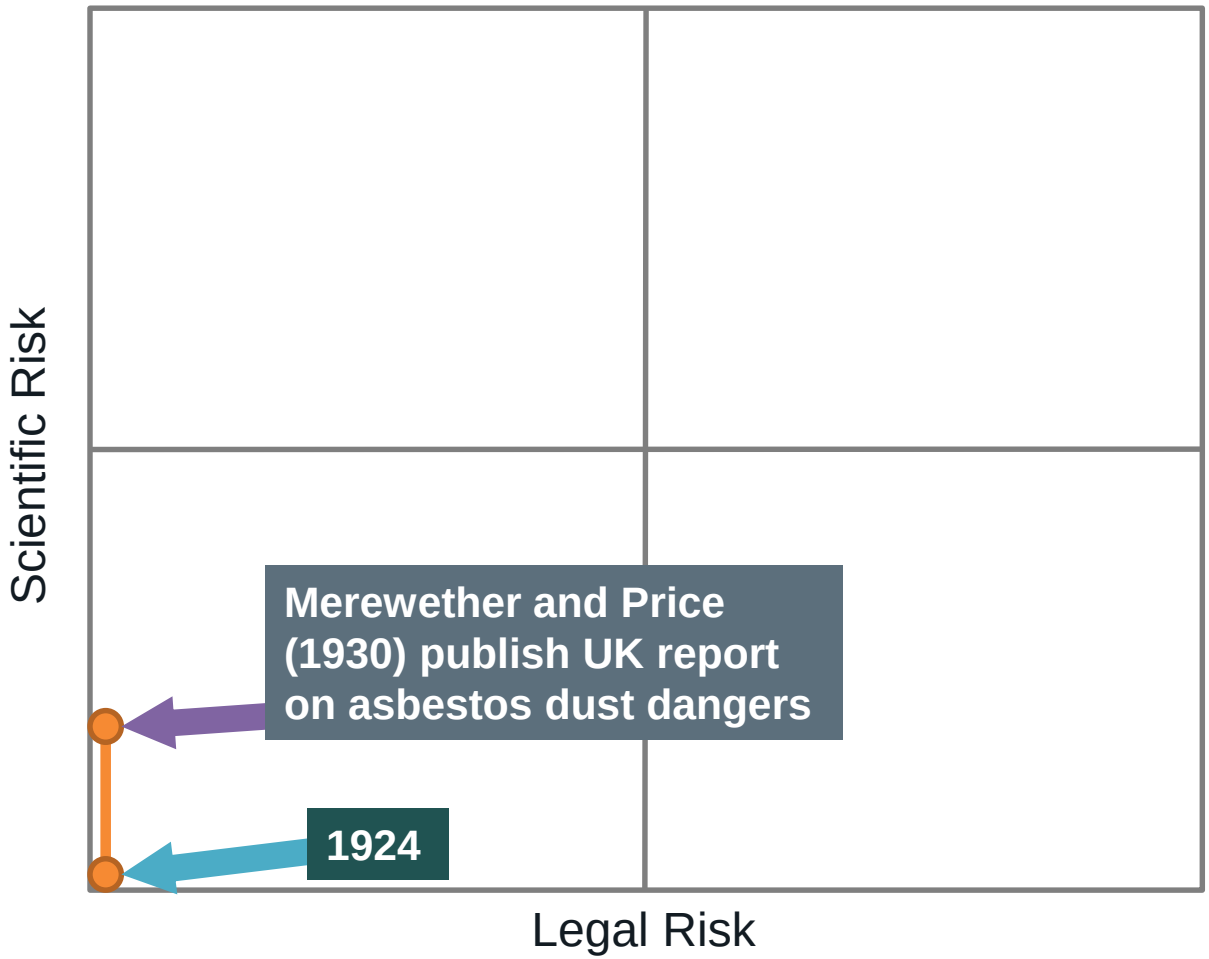

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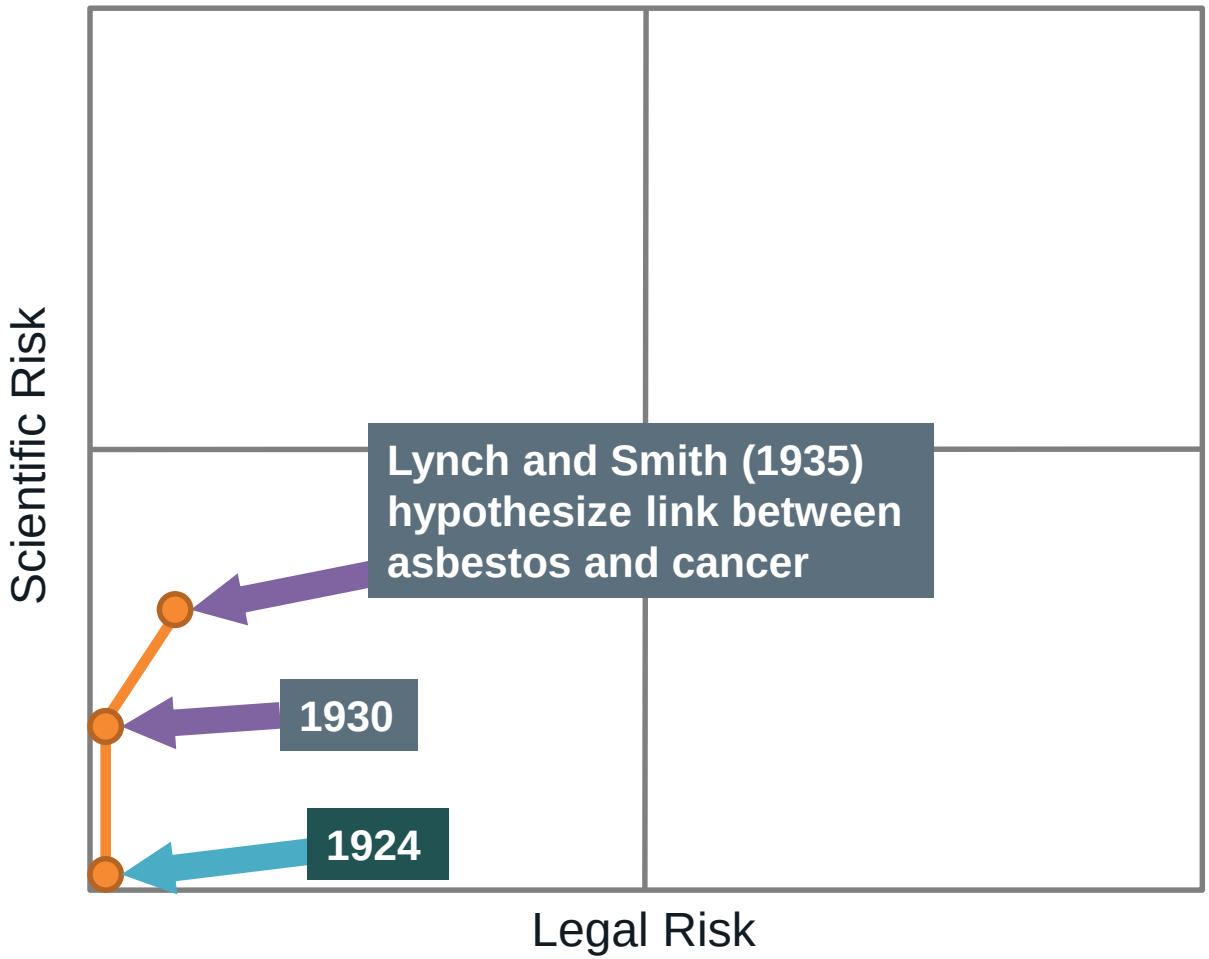

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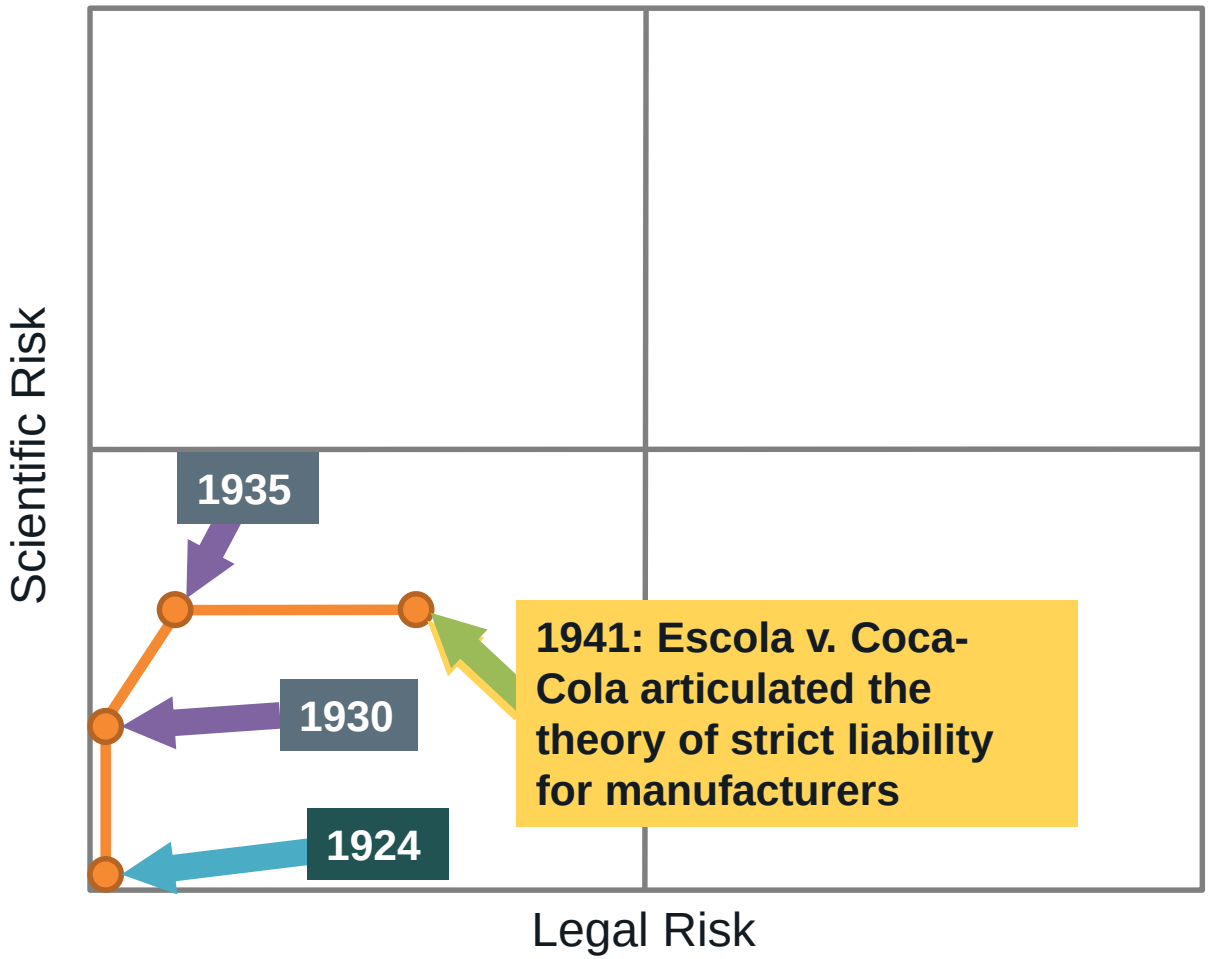

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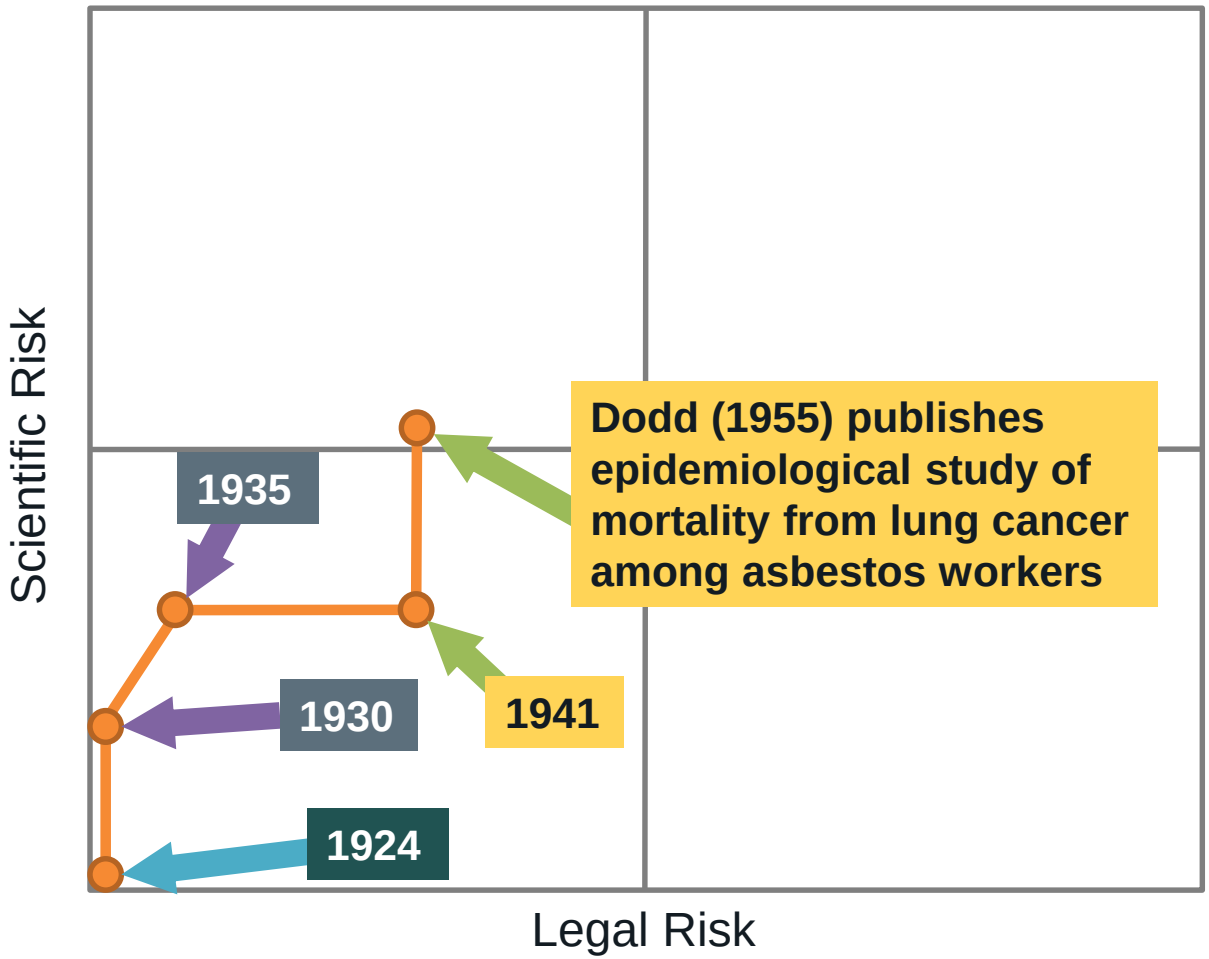

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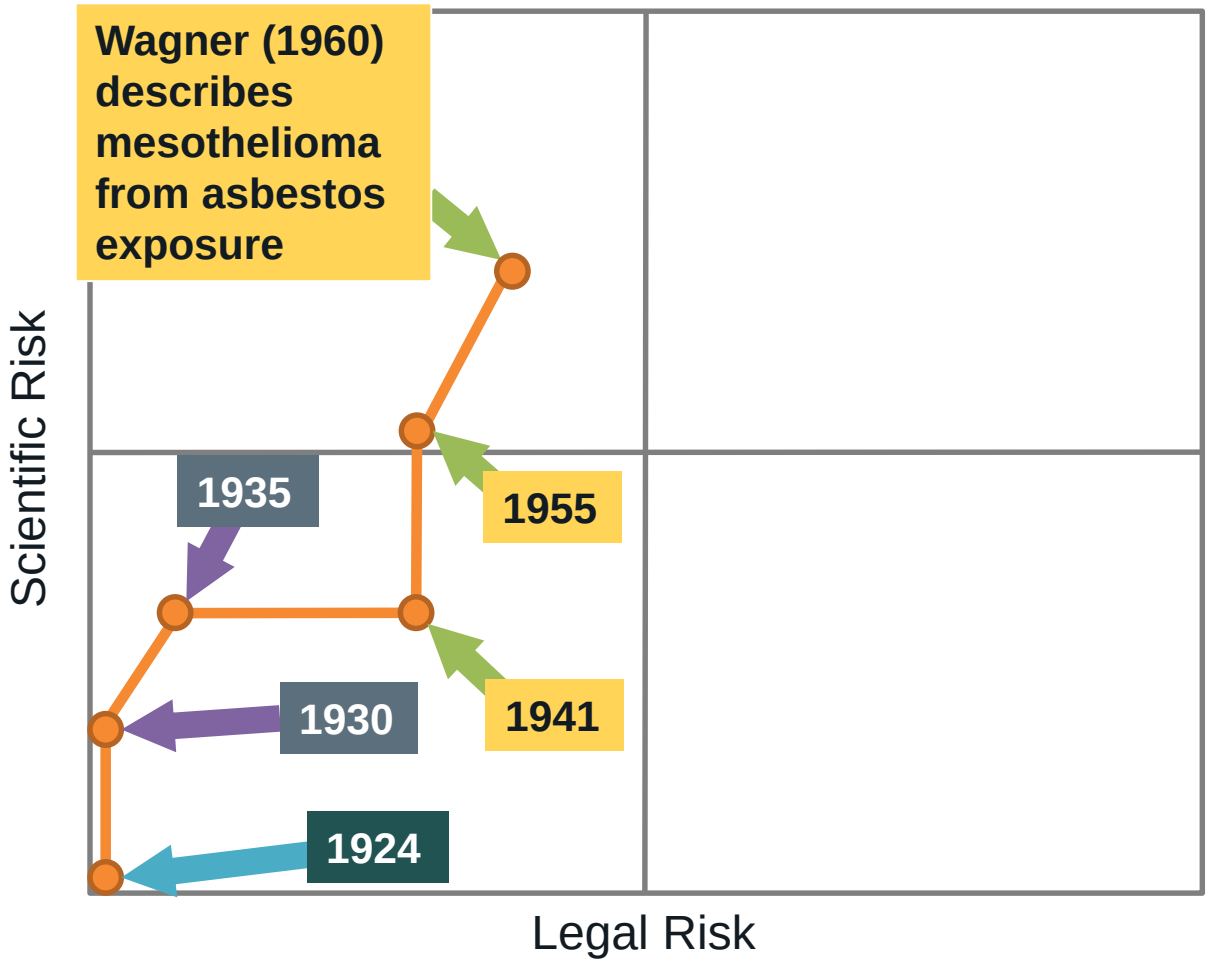

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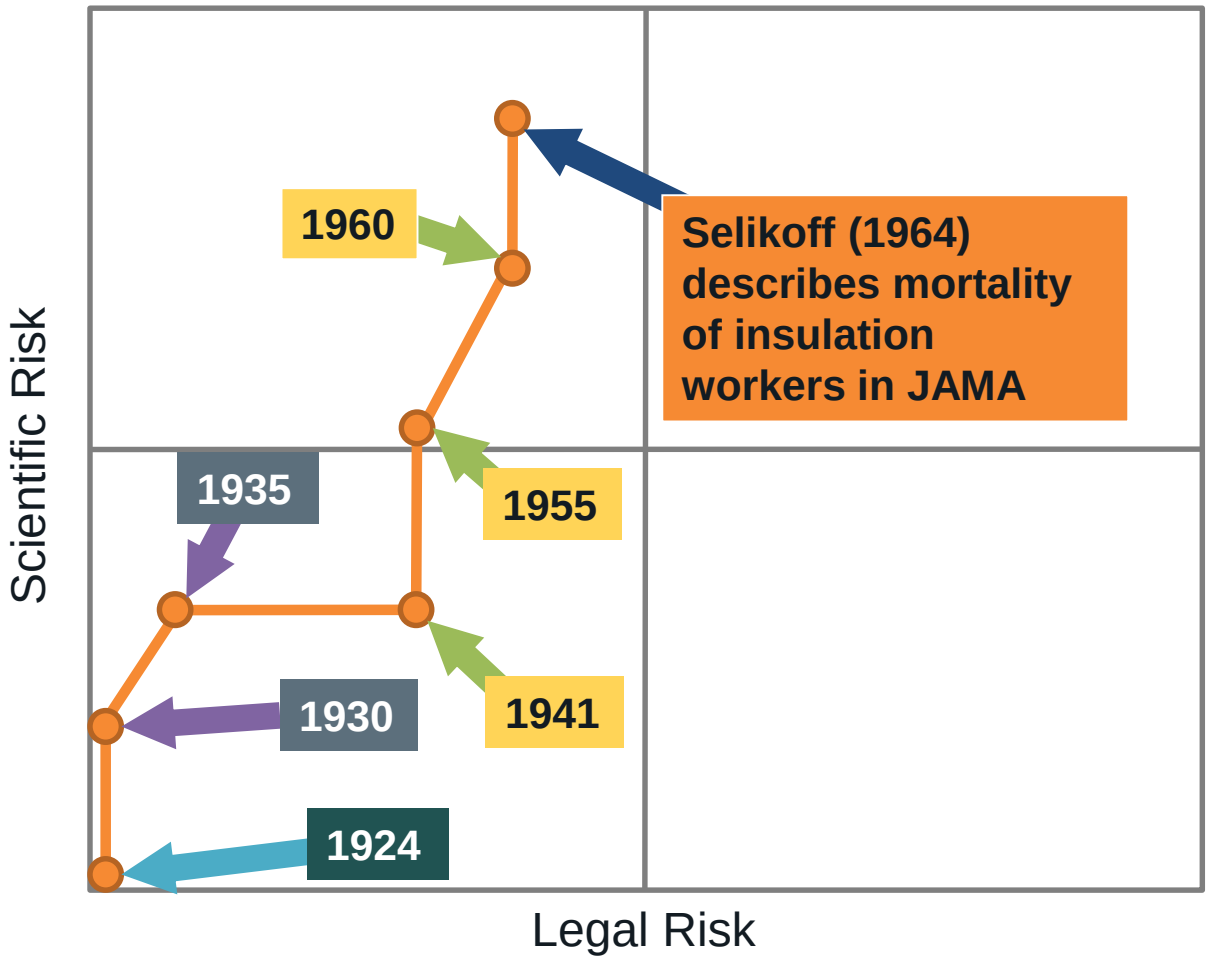
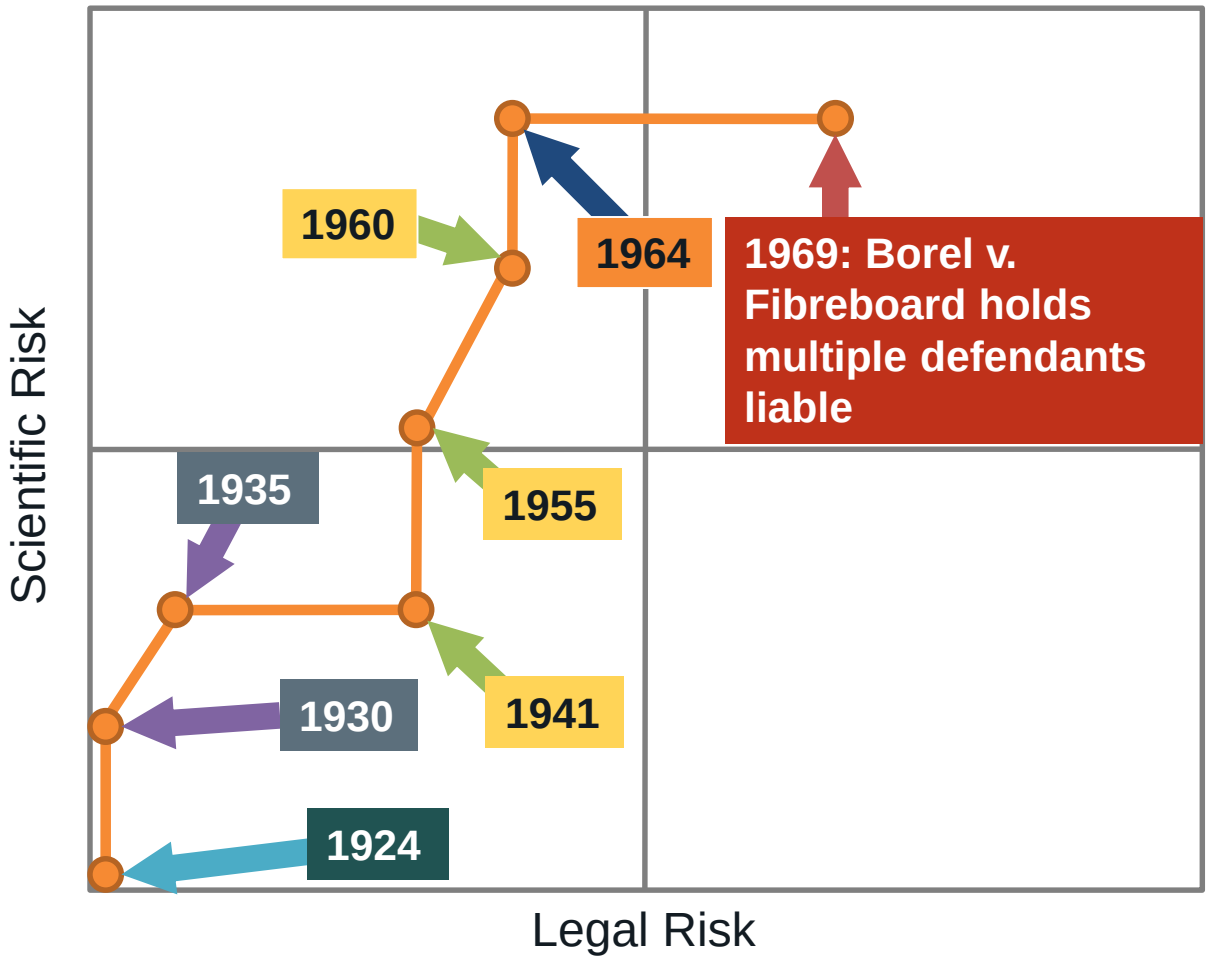
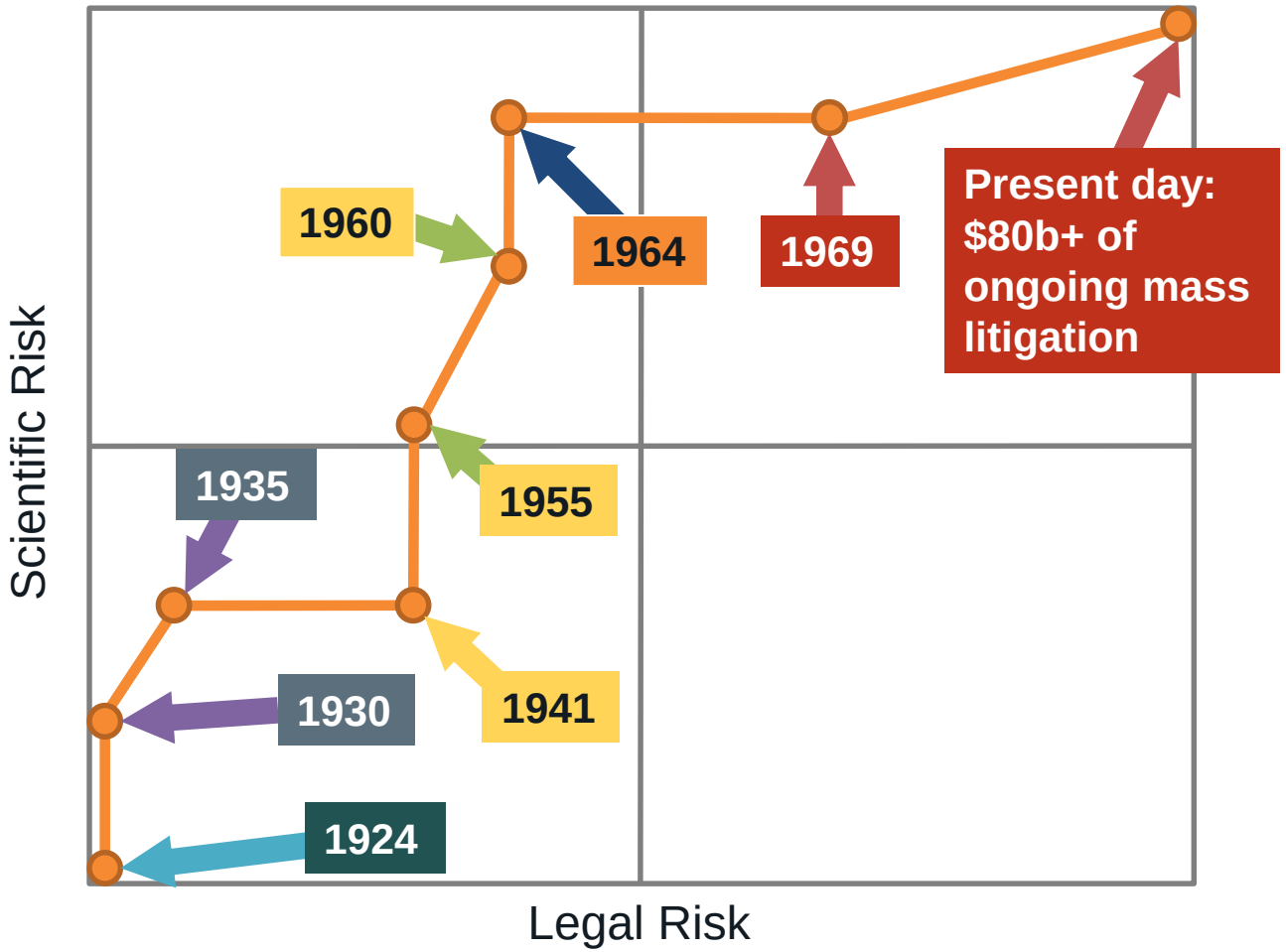


Science and law evolved to enable asbestos litigation



Science and law evolved to enable asbestos litigation

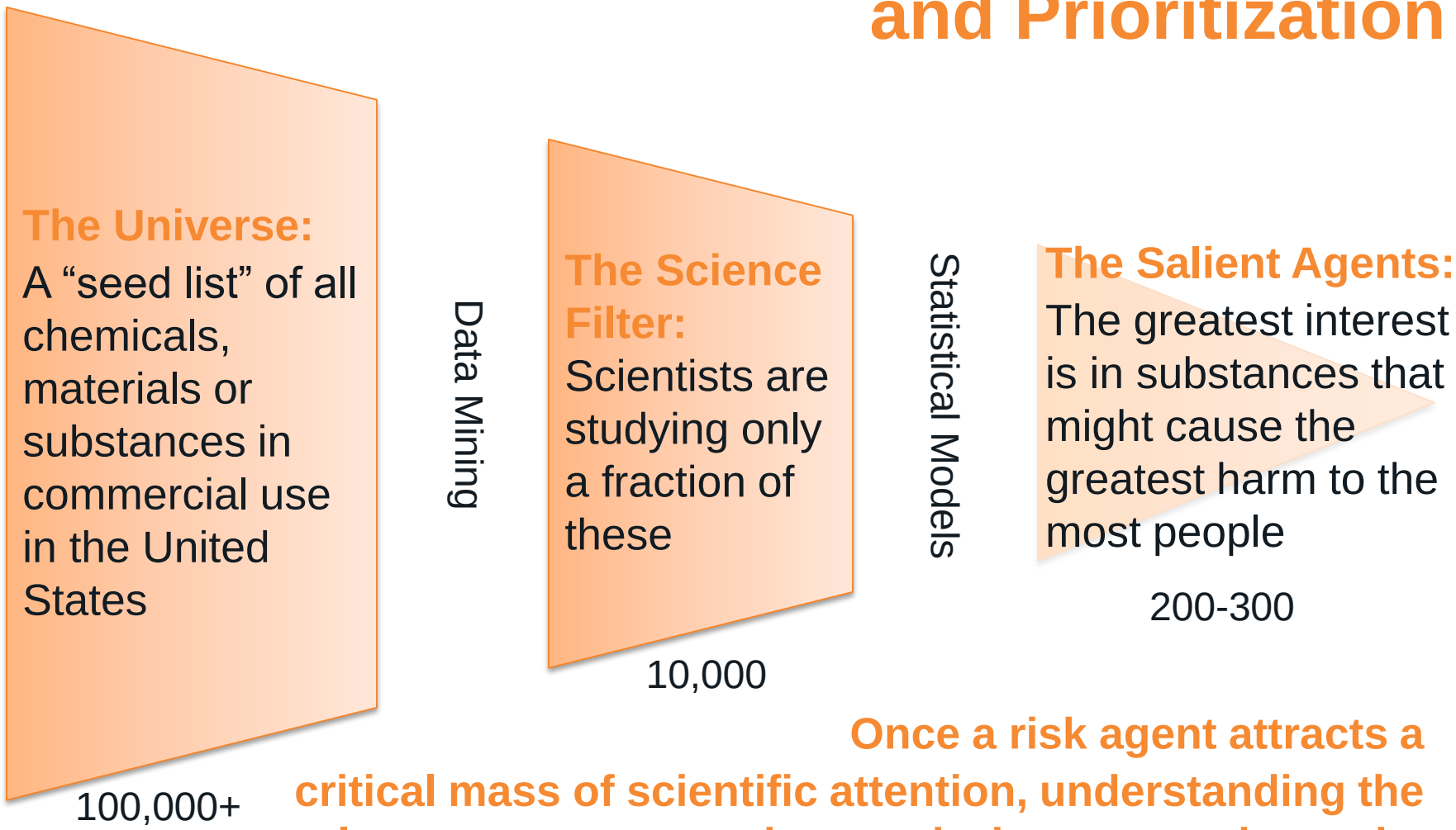


In US courts, admissibility of scientific evidence is determined primarily by judges via “Daubert hearings”

- Under Daubert (1993), the trial judge must exclude expert testimony unless it is "reliable" and correctly applies scientific method
  - The Supreme Court’s intent was to address the issue of “junk science”
- The biomedical literature forms the basis for Daubert hearings in bodily injury cases
- In latent bodily injury litigation, Daubert requires using the Hill Criteria to satisfy general causation (GC)
- Algorithms can extract the scientific evidence that will be used in Daubert hearings *as it is published*
- Tracking **whether** and **when** the science is strong enough to survive a Daubert hearing is now possible

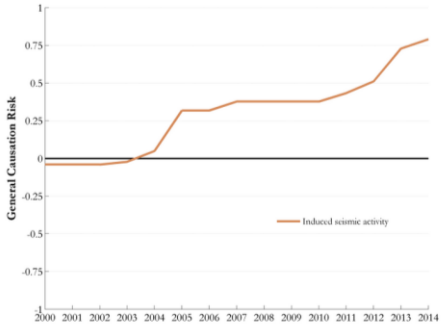
Scientific literatures are predictive of the likelihood of satisfying the Daubert standard

Algorithmic Emerging Risk Identification and Prioritization

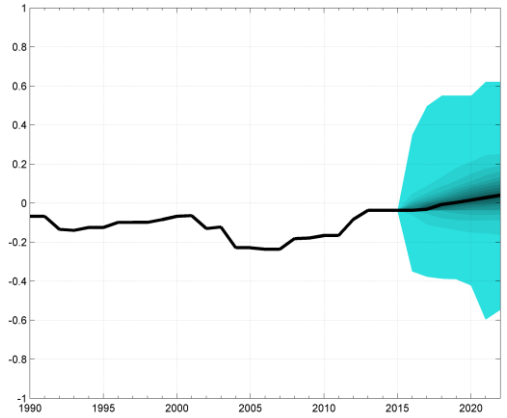


Once a risk agent attracts a critical mass of scientific attention, understanding the relevant exposure settings and what companies make and use it is possible.

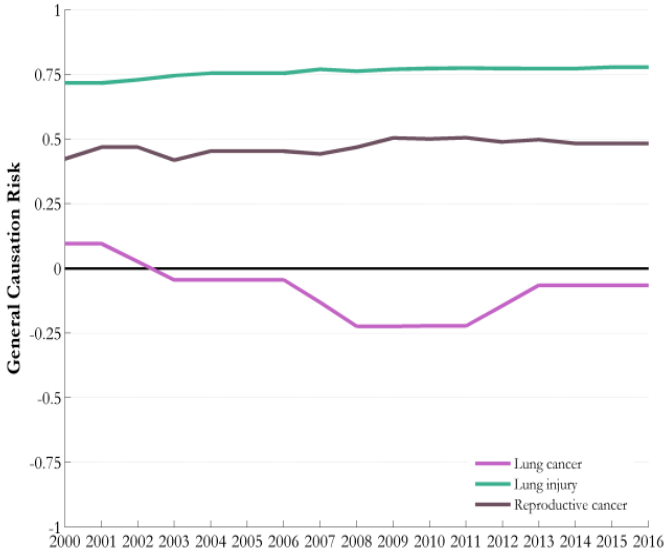
Once identified, the general acceptance of science can be modeled and predicted



Hypothesis: Wastewater injection causes earthquakes



Hypothesis: Exposure to formaldehyde causes cognitive impairment



Hypothesis: Exposure to talc causes ovarian cancer

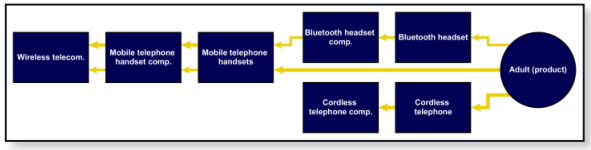
Even when science supports plaintiffs' claims, the law might not

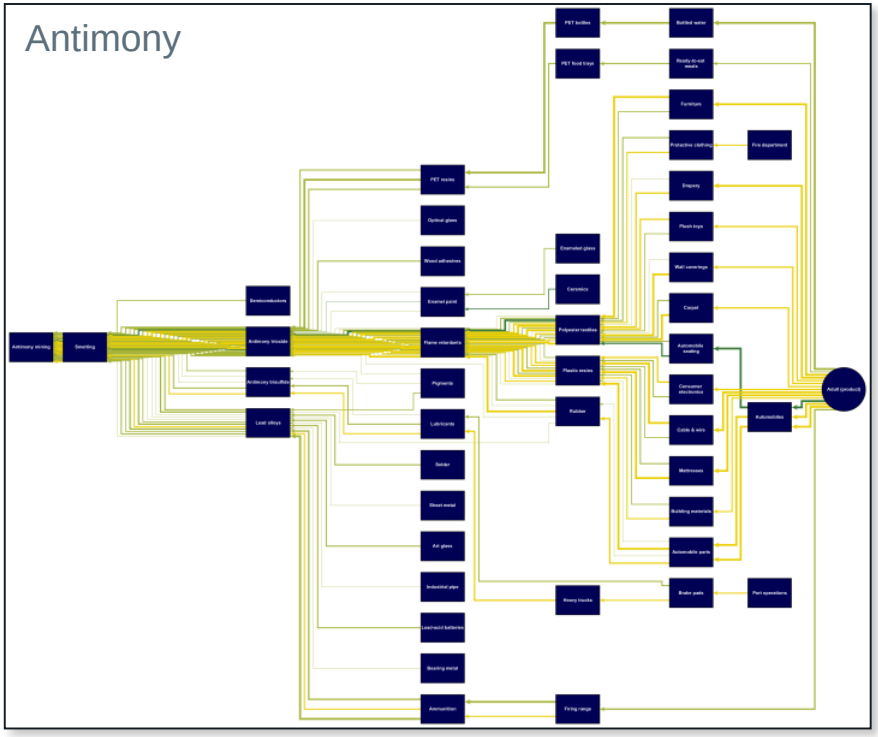
- Signaturosity
- Inculpolsity
- Disclaimability
- But will these defenses hold in the future?

Understanding the litigation-relevant exposures is possible

- Who is exposed and by whom?
- What is the severity of the alleged damages?
- How many will file claims *and when*?
- How rigorously will a claim be defended?
- What is the value of expected settlements?
- How will the losses be insured?

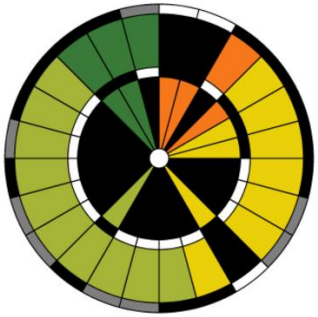
Cell Phones





Companies and industries are composites of emerging risks

Chemical Company



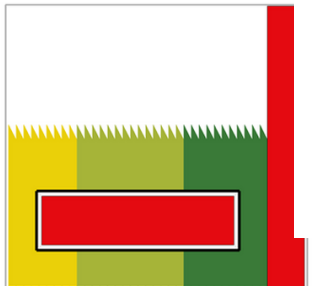
Litagion® Agent Links

Medium–High
- Di(2–ethylhexyl) phthalate
- Formaldehyde
- Benzene
- Styrene

Medium
- Toluene
- Dibutyl phthalate
- Tetrachloroethylene
- Chlorpyrifos
- Hexavalent chromium
- Butylated hydroxyanisole
- Mercury

NAICS 325620

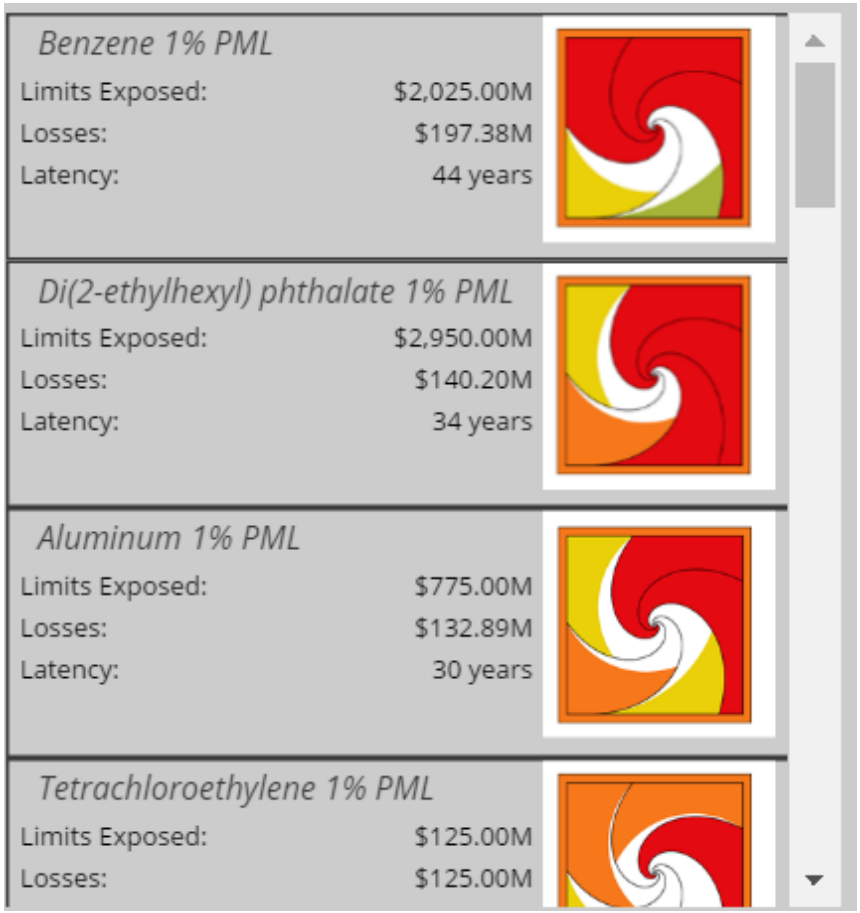
Personal Care Products



- Lead
- Dibutyl phthalate
- Toluene
- Di(2–ethylhexyl) phthalate
- Pyrethroids
- Formaldehyde
- Aluminum
- Talc
- Butyl benzyl phthalate
- Titanium dioxide nanoparticles

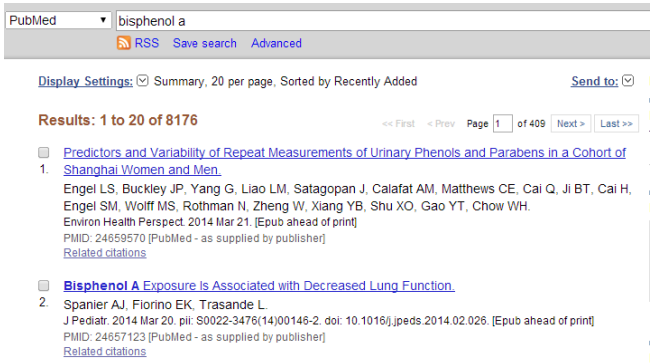
- Human scale:
  - Industries represent exposures
  - Unknown-unknowns
- Machine scale:
  - The products and business practices of companies represent “named peril exposures”
  - Known unknowns
  - Facilitates more effective underwriting, portfolio design, diversification

Scenarios for latent bodily injury litigation can be created when the underlying loss drivers are understood



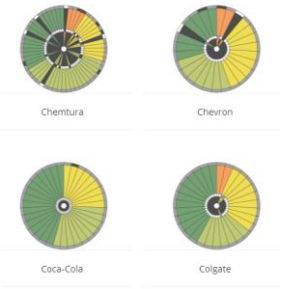
- Human Scale:
  - 3-5 Casualty RDS
  - Ad hoc stress testing
- Machine Scale:
  - Hundreds of Casualty RDS
  - Internally consistent
  - Estimated probabilities
  - Capital based on highest-exposure scenarios
  - More robust and appropriate capital strategy

The Next Generation Tools Promote Growth

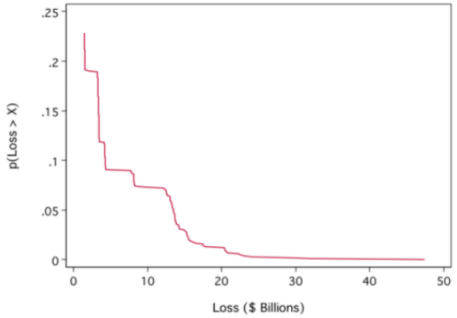


Identification
using science

Contextualization
of diverse risks



Projection
of risks into a portfolio



Quantification
for decision-making

Property and Liability: The Last 30 Years

Property

- Exposure-based property catastrophe models are part of the fabric
- Significantly higher premium growth over last 30 years
- Hurricane Katrina spread the loss without significant dislocation

Liability

- No liability catastrophe models
- Lower premium growth until recent years
- Reserve inadequacy the largest driver of insolvencies (A.M. Best)

The next 30 years: It is casualty's turn

Understanding what drives liability is essential to forecasting

Making a legal case in American court for bodily injury requires several elements and understanding them is important in assessing legal risk in the United States. Which of the following statements is true?

1. •Newspaper articles, blogs and trade journals are relevant to determining the whether the exposure was the cause of bodily injury.

2. •Juries hear all the evidence determined by the attorneys to be relevant and draw their own conclusions.

3. •Judges determine whether scientific evidence can be used based on its general acceptance.

4. •The rules of law in the U.S. are so poorly understood that each case is unpredictable.

5. •If scientists testify a chemical, product or substance is dangerous to humans, defendants always are held liable.

Praedicat is building technology for “data-driven foresight”

Praedicat is an “insure-tech” company based in L.A.

Our Target:

The Golden Age of Casualty

We use technology and data to solve fundamental problems of liability insurance so that our clients can grow and be sustainably profitable and the world can be cleaner, safer and healthier