



International Actuarial Association  
Association Actuarielle Internationale



# International Actuaries Day

Actuarial Intelligence - The  
AI Enhanced Actuary

Charles Cowling, IAA President

2 September 2024



# Today's Speakers



Charles Cowling  
(UK)

**IAA President**



Dorothy Andrews  
(USA)

**Senior Behavioral Data  
Scientist and Actuary  
for the National  
Association of  
Insurance  
Commissioners (NAIC)**



Adam Driussi  
(Australia)

**Co-founder and  
Chief Executive  
Officer of  
Quantium**

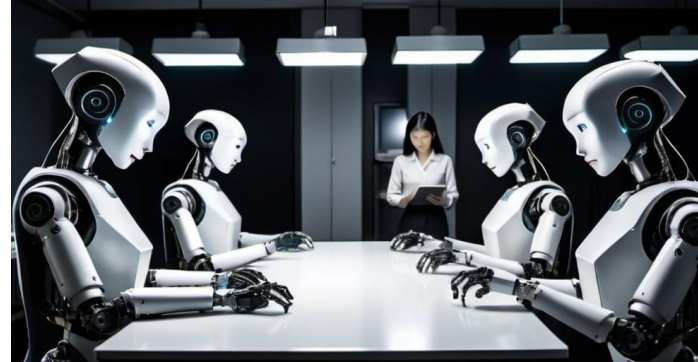
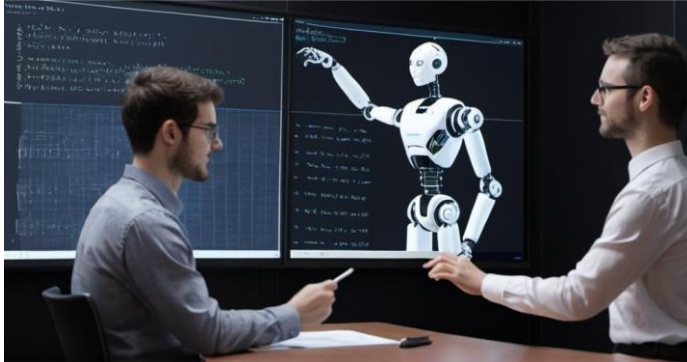
A man in a dark suit is seen from behind, looking out from a glass-walled building. The background is a city skyline at sunset or sunrise, with a bright sun low on the horizon. The image has a blue and orange color palette. The text "Actuarial Intelligence - The AI Enhanced Actuary" is overlaid at the bottom in white.

Actuarial Intelligence - The AI Enhanced Actuary



# Actuaries in an AI World: Four Futures

*Adjustment to actuarial roles*



*Impact to actuarial roles*





# From Artificial Intelligence to Actuarial Intelligence

## IAA Task Force

### Singapore Summit





# From Artificial Intelligence to Actuarial Intelligence

## IAA Response – AI Task Force & Work Streams

**Professionalism and Ethics** - Developing guidelines and principles for actuaries

**Education** - Developing enhanced curricula and training modules to include AI

**Changing role of Actuaries** - Developing basic definitions of AI; areas where AI can augment actuarial work; encouraging development of appropriate actuarial expertise

**Governance** - Monitoring and evaluating governance frameworks, policies, and regulations; engaging with regulators, standard-setting bodies, and policymakers

**Innovation** - Cultivating a growth mindset among actuaries



# Is there a future for Actuaries? Maybe, maybe not ... but ...

**Actuaries with AI  
will replace  
Actuaries without AI**

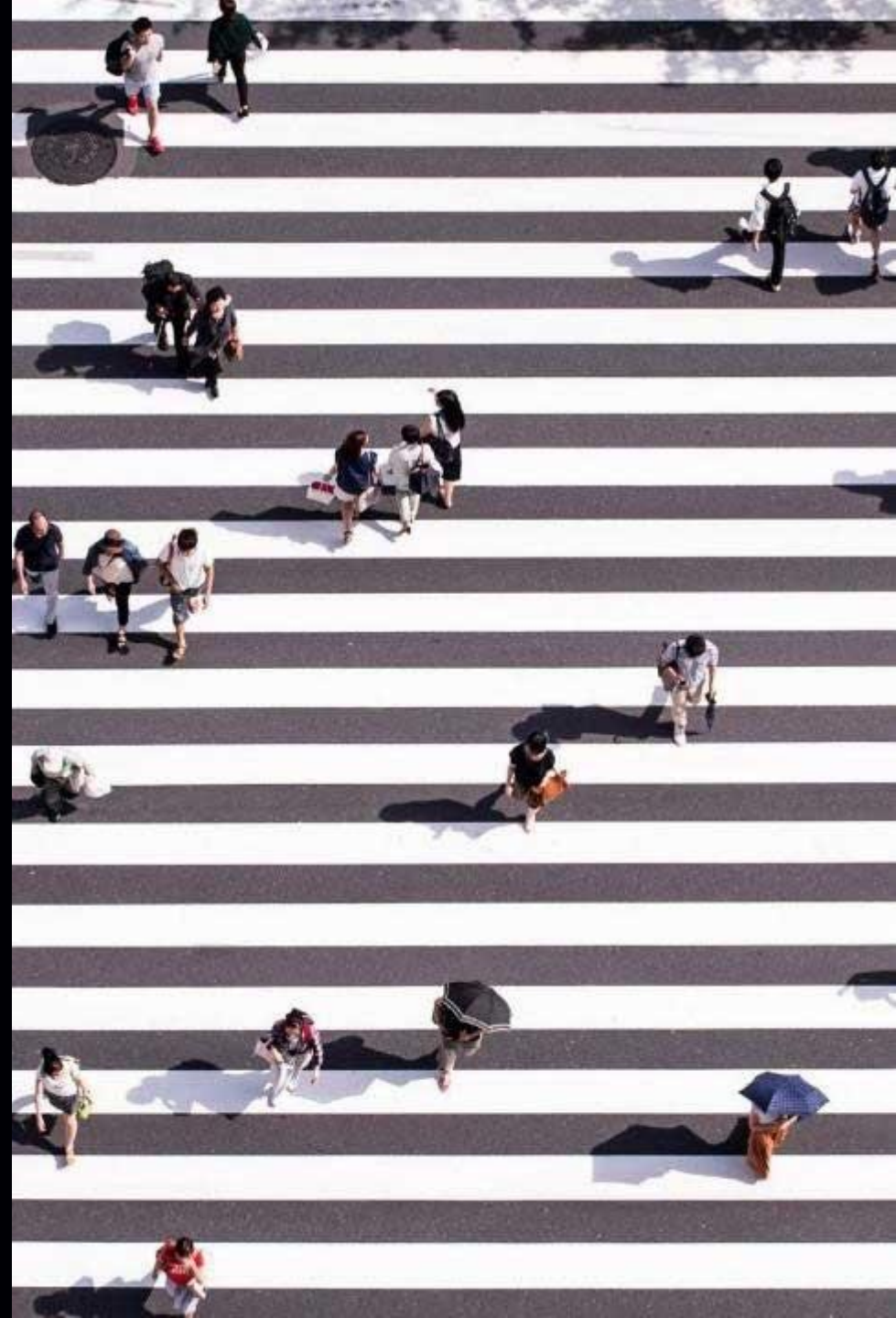
[Four Futures for Actuaries in the  
Wake of AI - Actuarial Review  
Magazine \(casact.org\)](#)



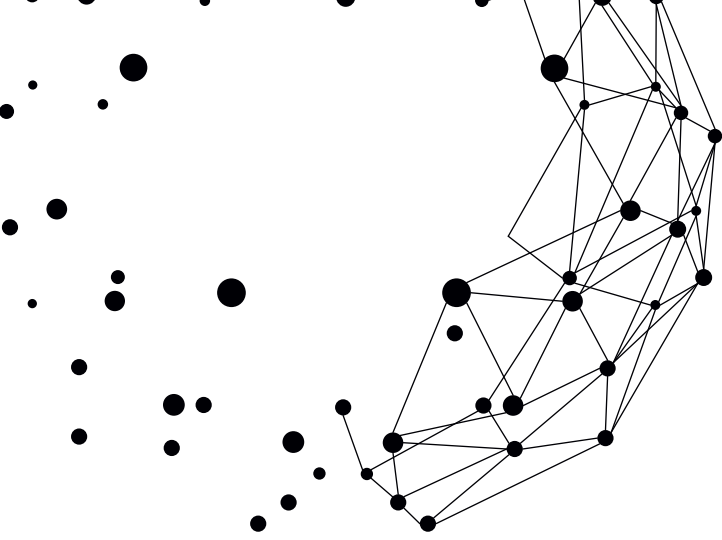
02 September 2024

# Actuarial Intelligence: The AI-Enhanced Actuary

Adam Driussi  
CEO, Quantum







Quantium helps businesses unlock value from data and analytics through platforms and services that combine best-in-class end-to-end capabilities



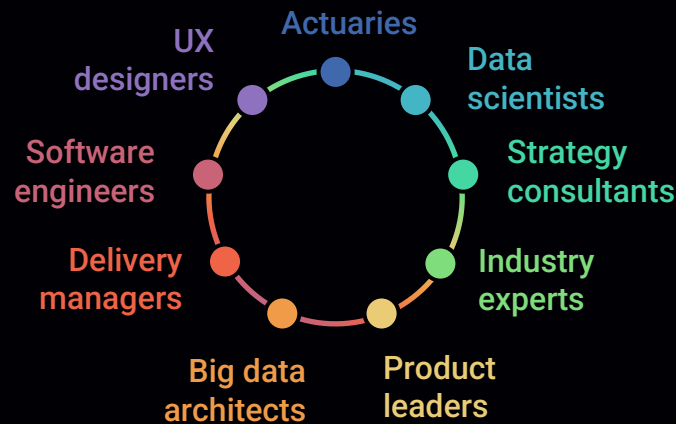
# 12 offices

worldwide across

# 6 countries

headquartered in Sydney

# 1200+ employees



# 1000+ clients

that have leveraged Quantium's products and consulting services



'A Leader' in Forrester Q2 2023 Customer Analytics wave report

### Research Assistant

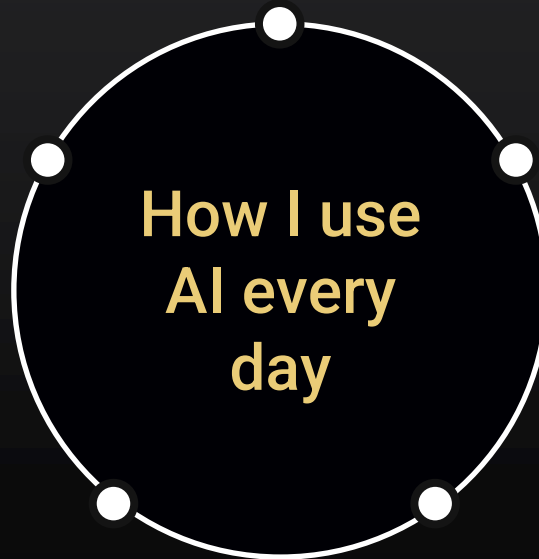
- Preparing for meetings with new prospects or client personas
- Find global examples of ideas

### Thought Partner

- Ask deeper and better questions
- Generates draft answers, providing me with leverage
- Enables me to focus on refining overall strategy

### Admin Assistant

- Meeting notes and actions etc
- EA admin and reminders



### Content Generator

- Develop initial drafts of speeches, reports, presentations
- Allows me to focus on adding value-adding insights and tailoring content to client needs

### Coach

- Provides feedback in real-time; flags potential issues or enhancements
- Voice assisted conversations
- Supports me in coaching direct reports

The AI-enhanced actuary isn't the future; AI is already powering savvy actuaries

## AI thought partner in action

“

I'm the CEO of a major international airline based in Oceania. Write me a brilliant prompt to ask Claude to answer the question of what we should consider (and do) if our main competitor starts flying regularly to multiple ports in the United States from our home base.



← Responding to Competitor's US Exp... ⋮

base.

1 Artifact

Here's a prompt designed to elicit a comprehensive and strategic response from Claude on this topic:

"As the CEO of a major international airline based in Oceania, I've just learned that our primary competitor is planning to launch regular flights from our home base to multiple destinations in the United States. This move could significantly impact our market share and profitability.

I need a thorough analysis of this situation and actionable strategies to maintain our competitive edge. Please provide:

1. A SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) of our airline in light of this new development.
2. Potential short-term and long-term impacts on our business, including market share, revenue, and customer loyalty.
3. A range of strategic options we should

 Reply to Claude 3.5 Sonnet



[ Copy prompt ]



1 Artifact

I'm running this prompt again so I can screen record the response:

As the CEO of a major international airline based in Oceania, I've just learned that our primary competitor is planning to launch regular flights from our home base to multiple destinations in the United States. This move could significantly impact our market share and profitability.

I need a thorough analysis of this situation and actionable strategies to maintain our competitive edge. Please provide:

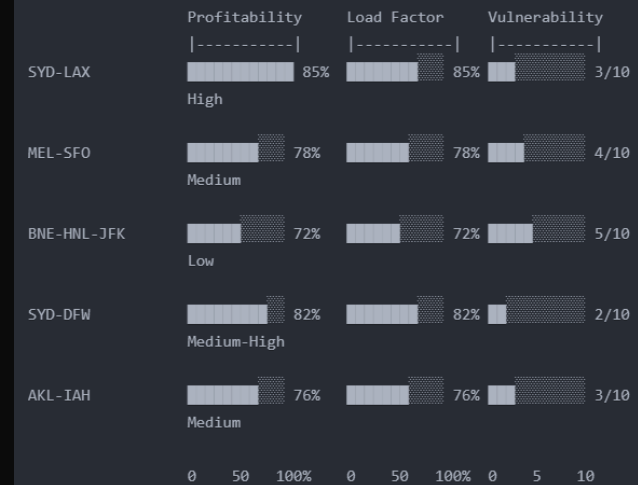
1. A SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) of our airline in light of this new development.
2. Potential short-term and long-term impacts on our business, including market share, revenue, and customer loyalty.
3. A range of strategic options we should consider, such as:
  - a) Expanding our own routes to the US
  - b) Forming alliances or codeshare agreements
  - c) Differentiating our service offerings
  - d) Adjusting our pricing strategy
  - e) Any other innovative approaches you'd

“

Can you create a visualisation of the route-by-route analysis you have conducted?



## Route-by-Route Analysis Visualization



Legend: ■ = 10%    ▨ = 10% (unfilled)

### Key Insights:

- ✈ SYD-LAX: Most profitable, high load factor, moderate vulnerability
- ✈ BNE-HNL-JFK: Least profitable, lowest load factor, highest vulnerability
- 🏠 SYD-DFW: Strong performer with low vulnerability
- 🌐 MEL-SFO & AKL-IAH: Solid performers with room for improvement

### Competitive Landscape:

- 🏆 SYD-LAX: Strong competition expected
- 🏆 MEL-SFO: Moderate competition, timing advantage may be challenged
- 🏆 BNE-HNL-JFK: High vulnerability due to stop in HNL
- 🏆 SYD-DFW: Limited initial competition due to strong partnership
- 🌐 AKL-IAH: Moderate competition, unique route advantage

### Strategic Importance:

- ★ ★ ★ SYD-LAX, MEL-SFO: Critical for overall US and Americas network
- ★ ★ BNE-HNL-JFK: Important for connectivity, but higher cost
- ★ ★ ★ SYD-DFW, AKL-IAH: Vital for airline alliances and partner networks

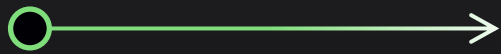
### Priority Actions:

1. Defend and optimize SYD-LAX route
2. Evaluate options to improve BNE-HNL-JFK profitability
3. Leverage SYD-DFW partnership for growth
4. Enhance MEL-SFO and AKL-IAH to boost profitability

# At Quantum, we're on an ambitious journey to becoming AI-powered – across every role, every person, every day

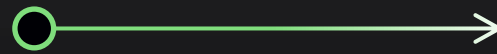
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## Why we're on this journey



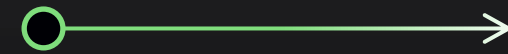
- Those who don't lead now will fall behind
- AI is redefining what value means to clients
- Attract & retain talent

## How we've started



- I'm role modelling as CEO
- Enabling team with tools
- Comprehensive L&D
- Guardrails for AI use
- Hackathons and cross-functional teams developing IP

## Where we're headed



- Continuous L&D
- 'App Store' for all Quantum-wide AI tools and use cases
- Measuring impact of use cases
- Regular AI knowledge sharing and celebration

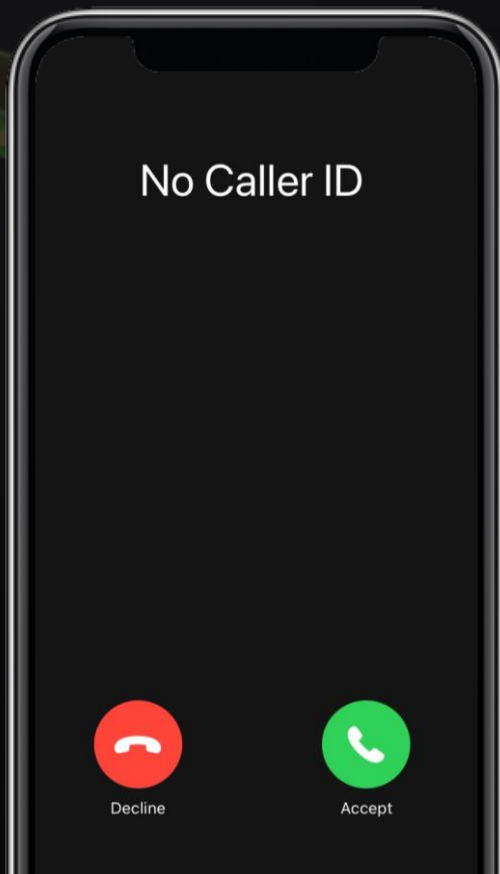
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We're also partnering deeply with leading brands to help their business, employees and customers benefit from the power of AI

## Telco

### Scam Insights

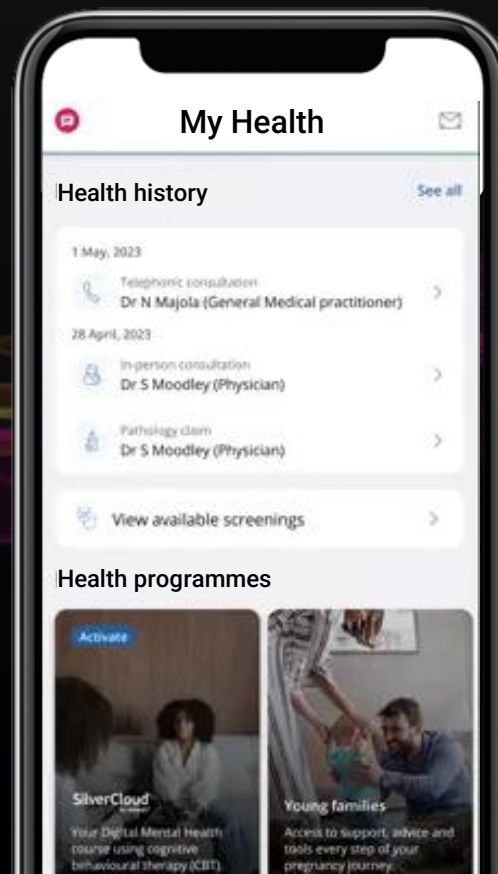
Supporting Telstra and Commonwealth Bank of Australia to protect Australians from scam and fraud.



## Health

### Personal health pathway

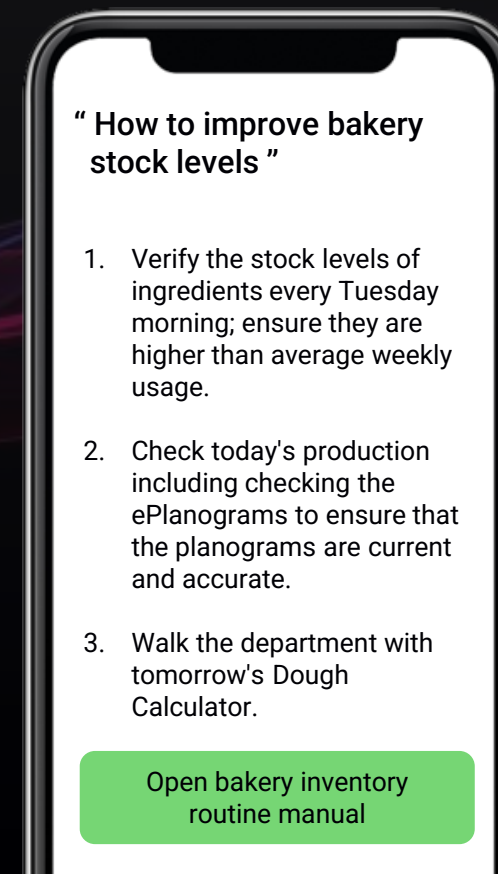
Partnering with Discovery to help personalise recommendations for people with chronic diseases and incentivise healthy lifestyles.



## Retail

### Quick Assist

Working with Woolworths to empower store team members with data driven insights to deliver better customer and operational outcomes.



As actuaries, we know the best form of learning is to dive in. AI is no different.

No amount of theory compares to hands-on experience.



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**Embrace AI to supercharge your daily work** by subscribing to a GenAI tool. Use it as your thought partner, research assistant, content generator and coach. Actively think: “How can I use AI to support me in every single thing I do every single day?”

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**Upskill proactively** by focusing on practical applications and finding time each week to learn

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**Collaborate** through forums like these to share AI learnings and experiences – the wins and the challenges

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**Lead this change in your teams and organisation** by role-modelling and championing day-to-day AI adoption in your teams – get involved!



Thank you



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Association Actuarielle Internationale

**International Actuaries Day**  
**Artificial Intelligence – The AI Enhanced Actuary**  
**September 2, 2024**

## **Where Does Bias Hide?**

*Defining Data Biases and Unfairly  
Discriminatory Considerations*

Dorothy L. Andrews, PhD, MAAA, ASA, CSPA  
Senior Behavioral Data Scientist and Actuary  
National Association of Insurance Commissioners (NAIC)

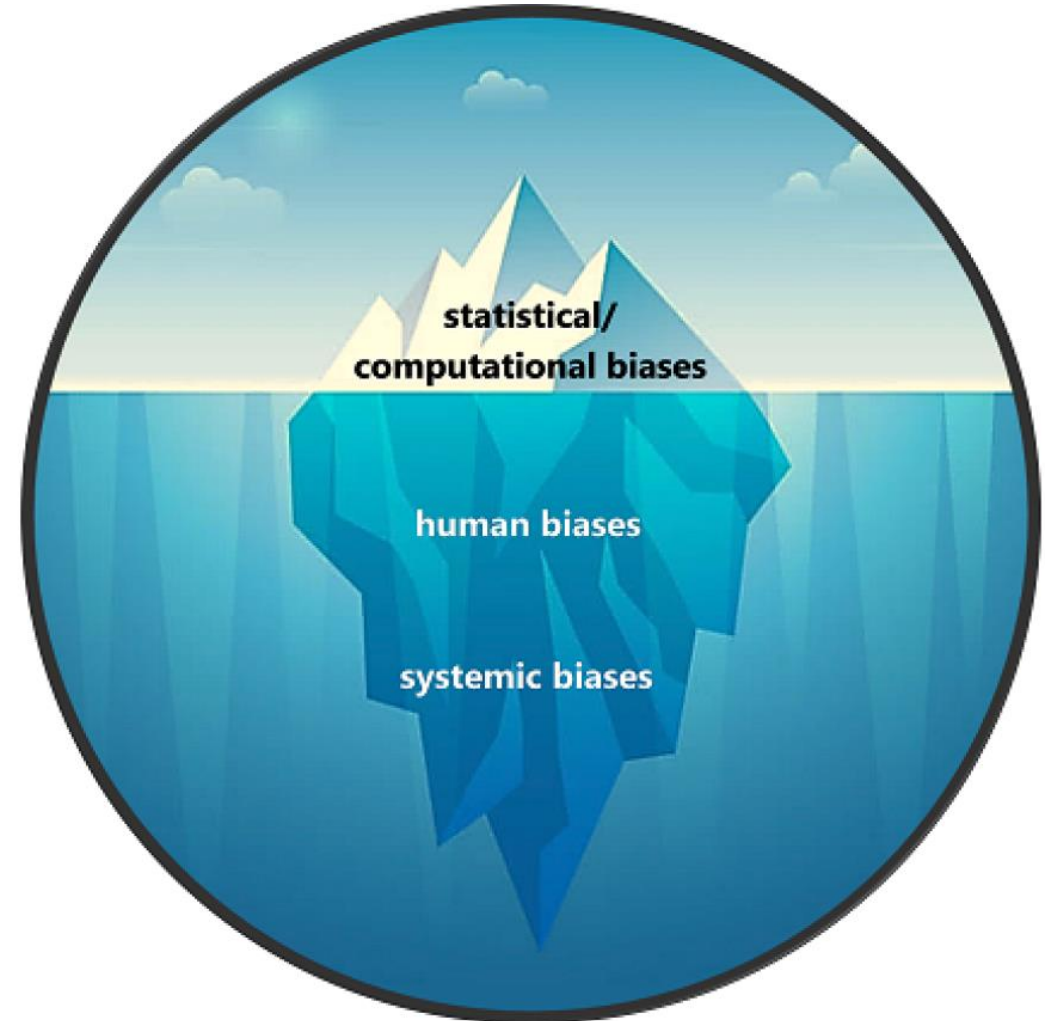


NIST Special Publication 1270

# Towards a Standard for Identifying and Managing Bias in Artificial Intelligence



Reva Schwartz  
Apostol Vassilev  
Kristen Greene  
Lori Perine  
Andrew Burt  
Patrick Hall



A graphic showing two human profiles facing each other, filled with a complex network of colorful circuit lines (red, blue, green, yellow) on a light background. A dark blue horizontal bar is overlaid across the middle of the image, containing white text.

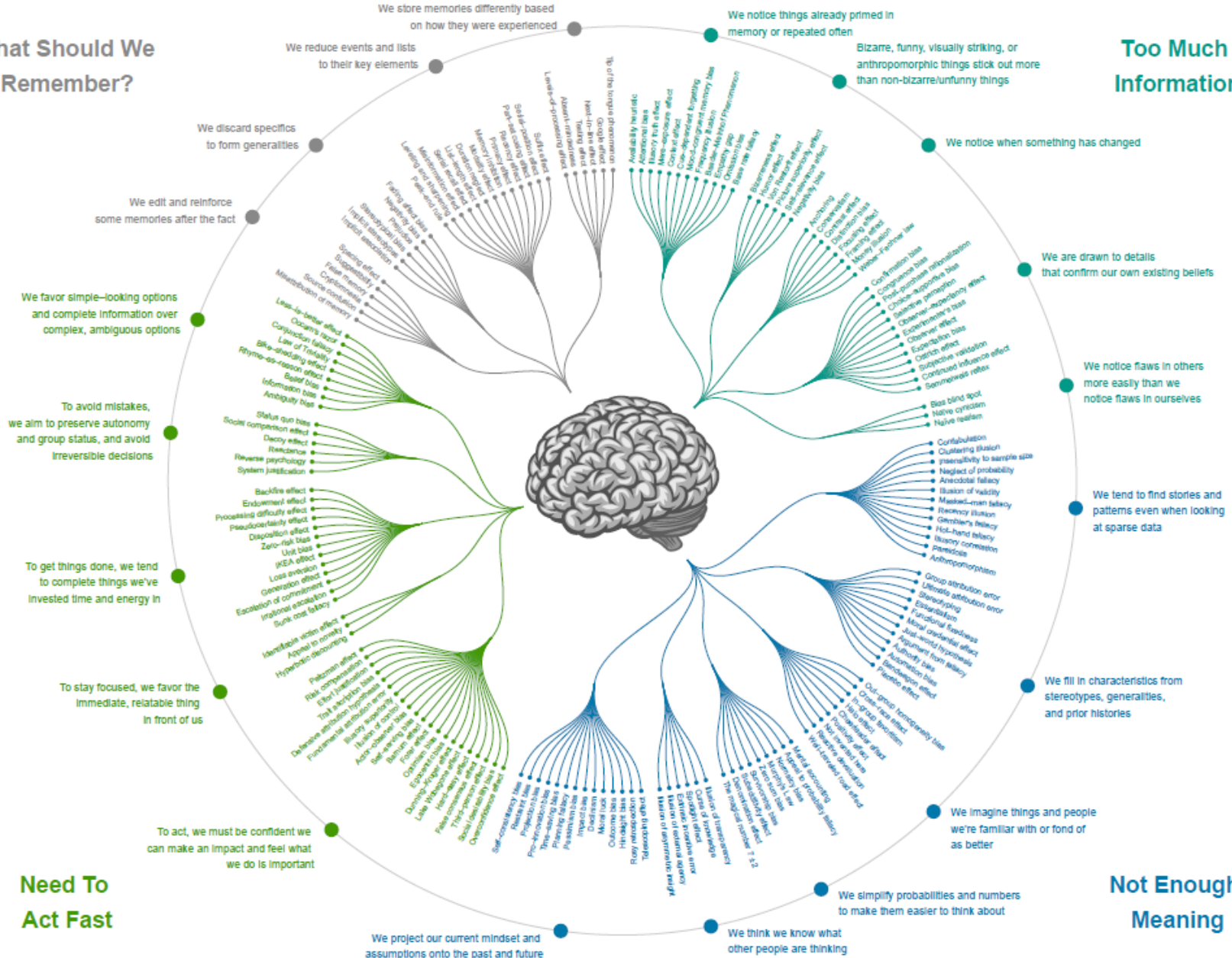
*“Bias in data is the result of human activity!”*

*Dorothy L. Andrews, Ph.D.*

# THE COGNITIVE BIAS CODEX

What Should We Remember?

Too Much Information

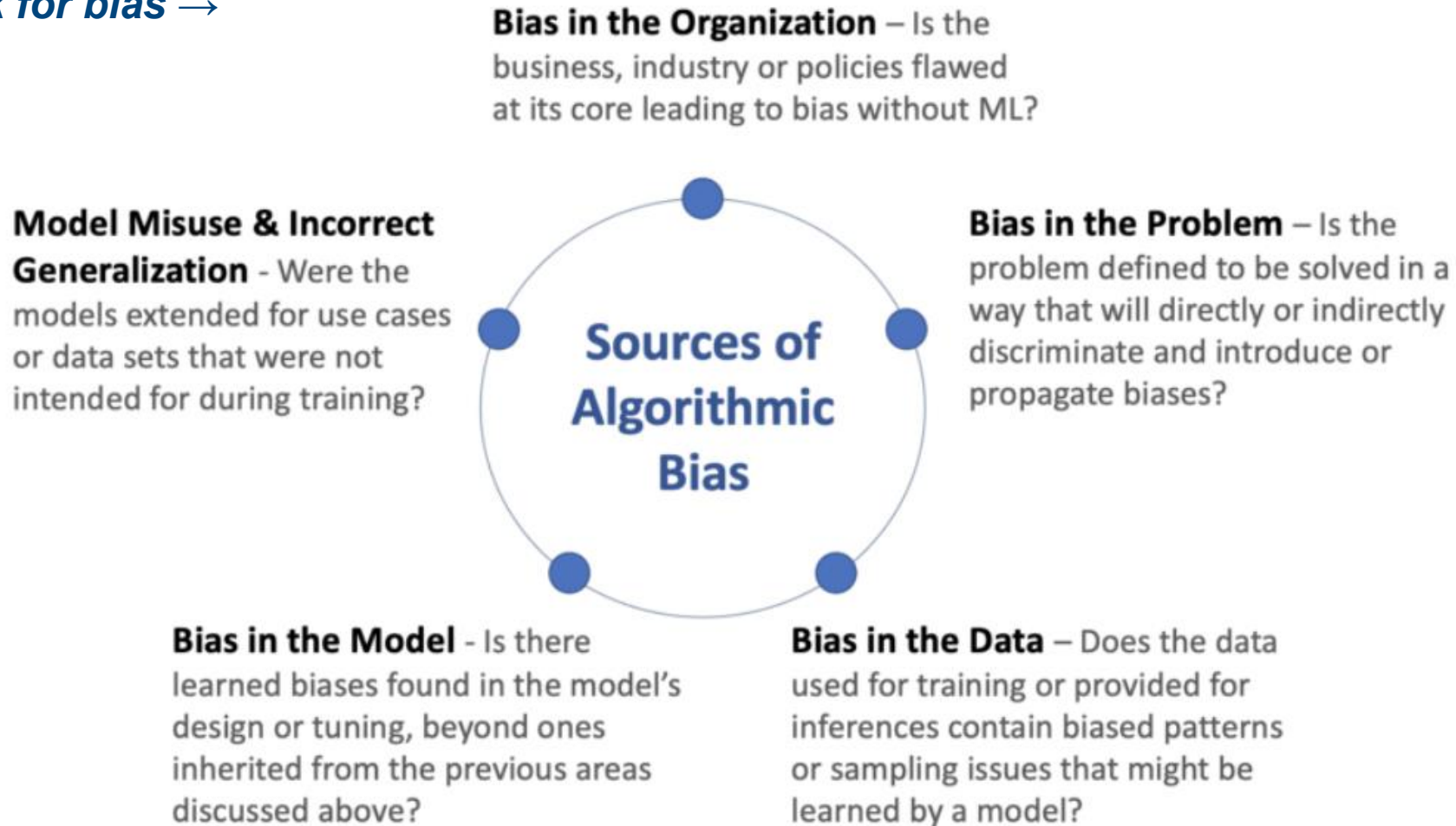


Where Does Bias Hide?

Need To Act Fast

Not Enough Meaning

*Places to look for bias* →



# Biases to BOLO?

(Be On the Look Out)

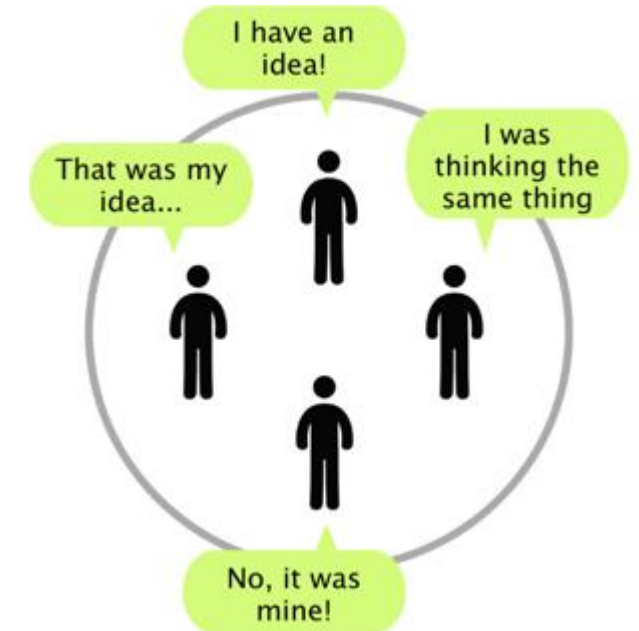
## Statistical Bias

$$\text{Bias} = E[\hat{\theta}] - \theta$$

## Deployment Bias



## Groupthink Bias







## **Use Cases of Bias in Artificial Intelligence**

## Faulty Target Variable

To compute who should qualify for this extra care, the algorithm's designers used previous patients' health care spending as a proxy for medical needs—a common benchmark.

## Problematic Definition

Blacks do not have the same access to healthcare as whites and do not have the same level of need and even when access is the same, blacks tend to use medical services less than whites.

### Where Does Bias Hide?

## Racial Bias Found in a Major Health Care Risk Algorithm

Black patients lose out on critical care when systems equate health needs with costs

By Starre Vartan on October 24, 2019



# GENDER- BIASED HIRING TOOL

## amazon



# Green Light Technology

Skin with more melanin blocks green light, making it harder to get an accurate reading. The darker your skin is, the harder it gets.



Journal of  
*Personalized*  
*Medicine*



Article

## Accuracy in Wrist-Worn, Sensor-Based Measurements of Heart Rate and Energy Expenditure in a Diverse Cohort

Anna Shcherbina <sup>1,†</sup>, C. Mikael Mattsson <sup>1,2,†</sup>, Daryl Waggott <sup>1,3,†</sup>, Heidi Salisbury <sup>3</sup>, Jeffrey W. Christle <sup>1</sup>, Trevor Hastie <sup>4,5</sup>, Matthew T. Wheeler <sup>1,3</sup> and Euan A. Ashley <sup>1,3,5,\*</sup>



Where Does Bias Hide?



# The Modelers' Hippocratic Oath

*I will remember that I didn't make the world, and it doesn't satisfy my equations.*

*Though I will use models boldly to estimate value, I will not be overly impressed by mathematics.*

*I will never sacrifice reality for elegance without explaining why I have done so.*

*Nor will I give the people who use my model false comfort about its accuracy. Instead, I will make explicit its assumptions and oversights.*

*I understand that my work may have enormous effects on society and the economy, many of them beyond my comprehension.*

– Emanuel Derman and Paul Wilmott

## Initializing the basic TRUST LOOP



AS WE WORK TOGETHER OUR ABILITY TO SHARE CONCEPTUAL THOUGHT IMPROVES AND AS A TEAM WE ARE ABLE TO TACKLE MORE COMPLEXITY.



# Lessons for AI Modeling

- ❑ Diversity & Inclusion are vital to building good, responsible, and ethical AI
- ❑ Representativeness is needed in modeling data and on modeling teams
- ❑ Data set size does not guarantee diversity or algorithmic fairness
- ❑ Algorithms can discriminate without explicit protected class data, will mirror biases in modeling data and amplify those biases in algorithmic outcomes!
- ❑ Sociotechnical approaches must be employed to mitigate algorithmic bias
- ❑ “All models are wrong, but some are very useful!” – Dr. George E. P. Box