# Turing Fellow
# Norman Fenton

*Focus: Quantitative risk assessment using causal, probabilistic models (Bayesian networks)*

Courtesy of the BBC "Climate Change by Numbers"

- Professor of Risk Information Management
- Director of Agena, specialising in risk assessment for critical systems
- Applications include law and forensics (been an expert witness in major criminal and civil cases), medicine, software reliability, transportation, finance, football prediction

## *We can't answer important questions using just "big data" and clever machine algorithms – no matter how much data we have*

EXAMPLE: Recent headline

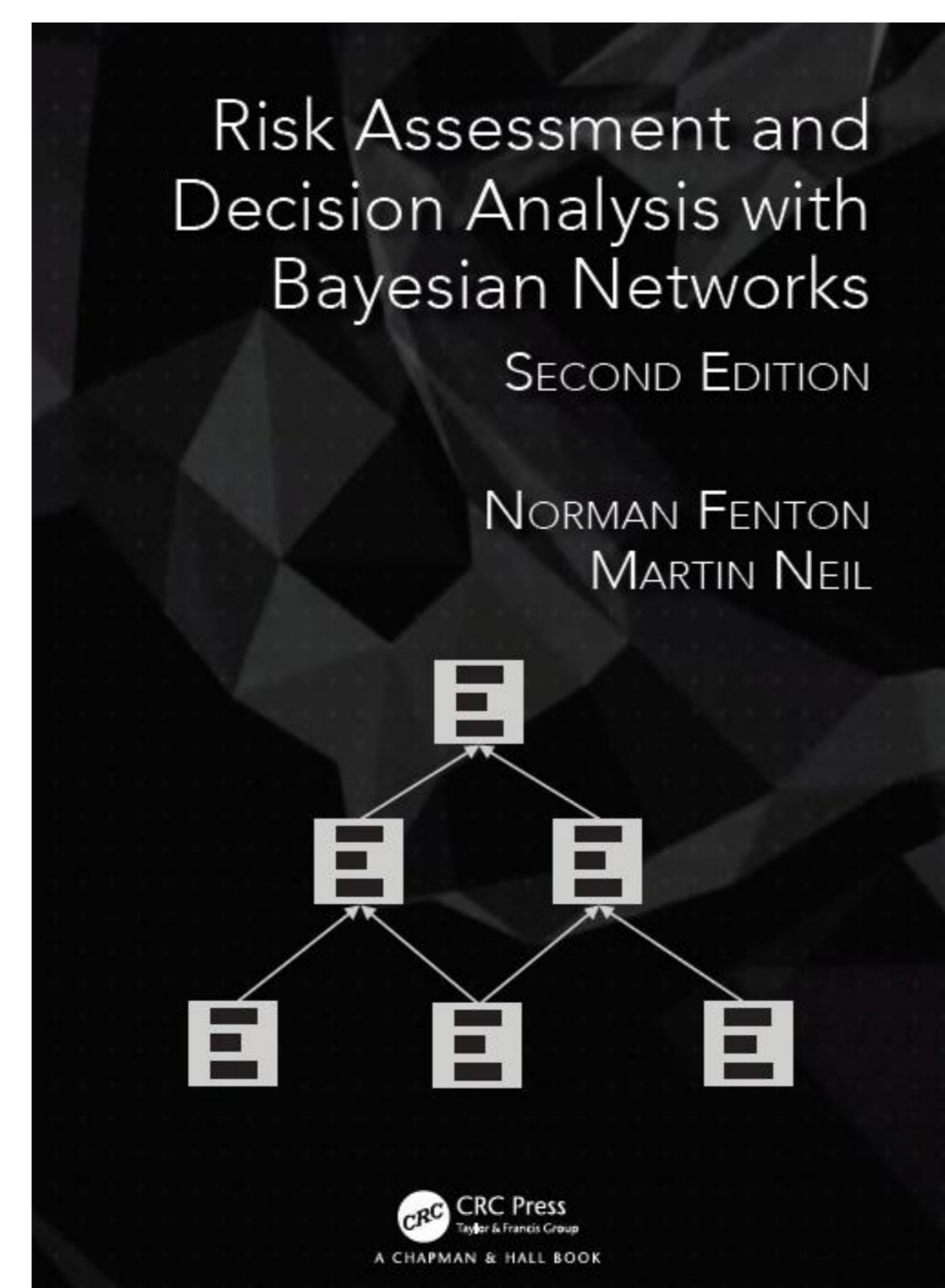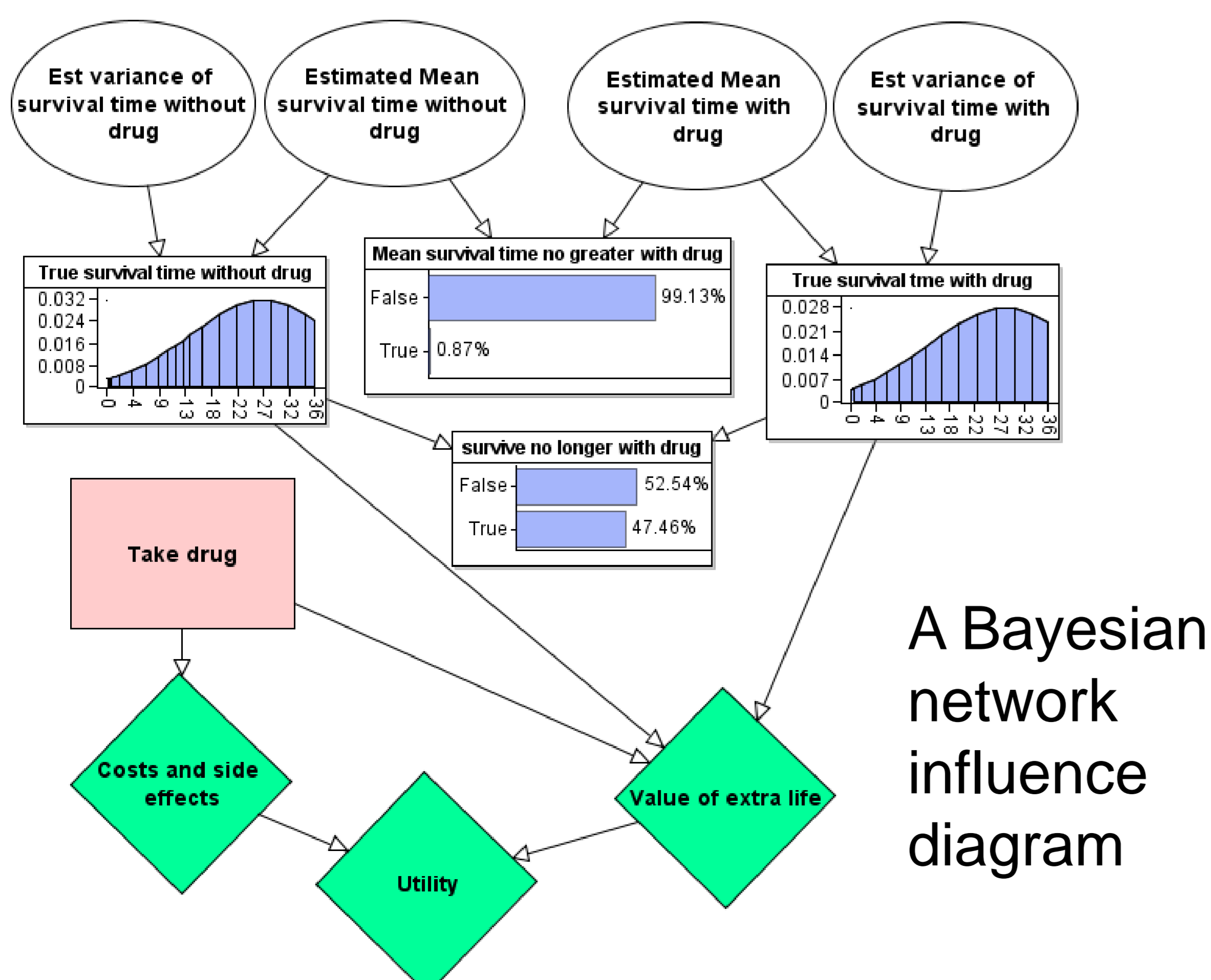**Drinking 2 glasses of wine a day triples the risk of getting mouth cancer**

What does this mean?  We want to know things like:
- What is the probability Jane Smith will get mouth cancer in the next 10 years?
- What about if she stops drinking wine?
- What if she'd stopped drinking wine 5 years ago?

### *It's all about 'smart data' not 'big data'*

For critical risks like terrorist attacks or financial meltdowns  relevant data are scarce. We adopt causal models – **Bayesian networks** - that incorporate expert judgement with whatever data are available. These provide more powerful insights and better decision making than is possible from purely data-driven solutions."

A Bayesian network influence diagram

Risk Assessment and Decision Analysis with Bayesian Networks
SECOND EDITION
NORMAN FENTON
MARTIN NEIL
CRC Press
A CHAPMAN & HALL BOOK

"*The single most important book on Bayesian methods for decision analysts*" —
**Doug Hubbard** (author in decision sciences and actuarial science)

"*The book provides sufficient motivation and examples (as well as the mathematics and probability where needed from scratch) to enable readers to understand the core principles and power of Bayesian networks.*" —
**Judea Pearl** (Turing award winner)