THE RENAISSANCE OF TRUTH IN RISK BASED DECISION MAKING

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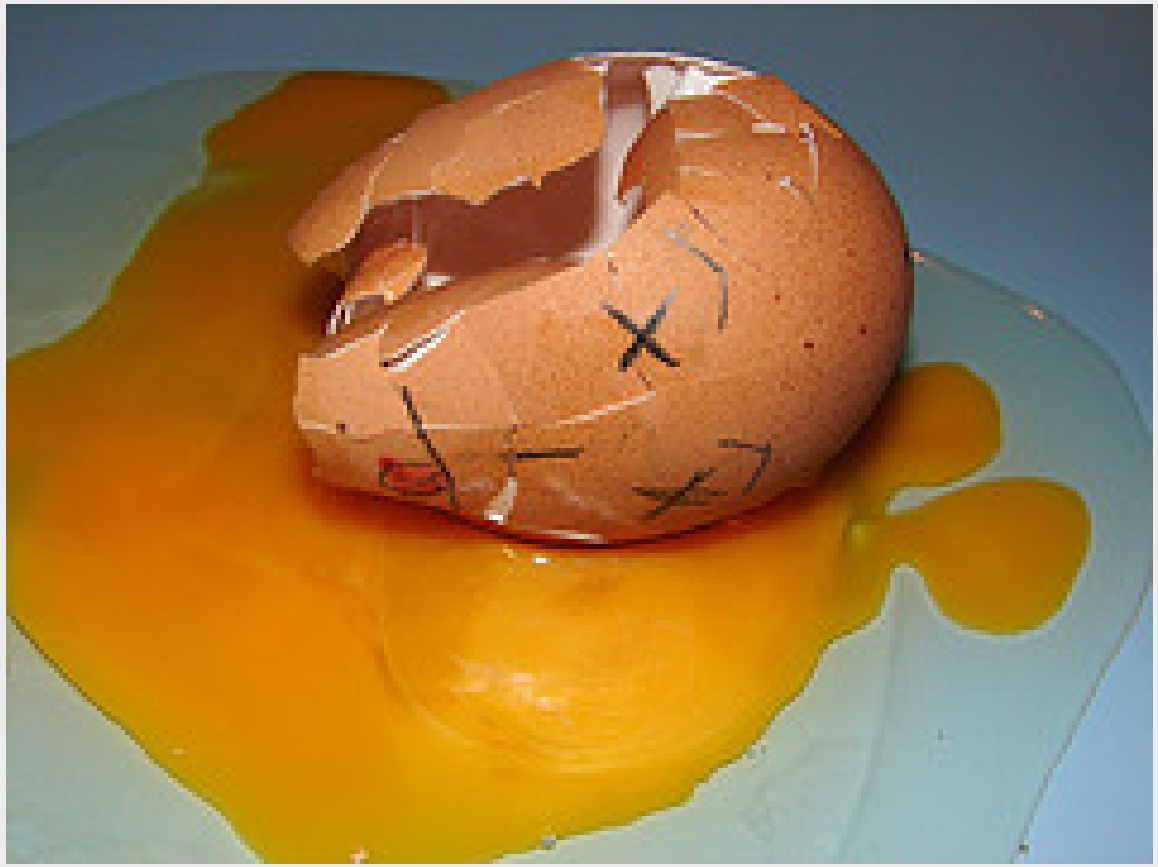
Assoc. Prof Arnold Dix Eng.
Lawyer & Scientist

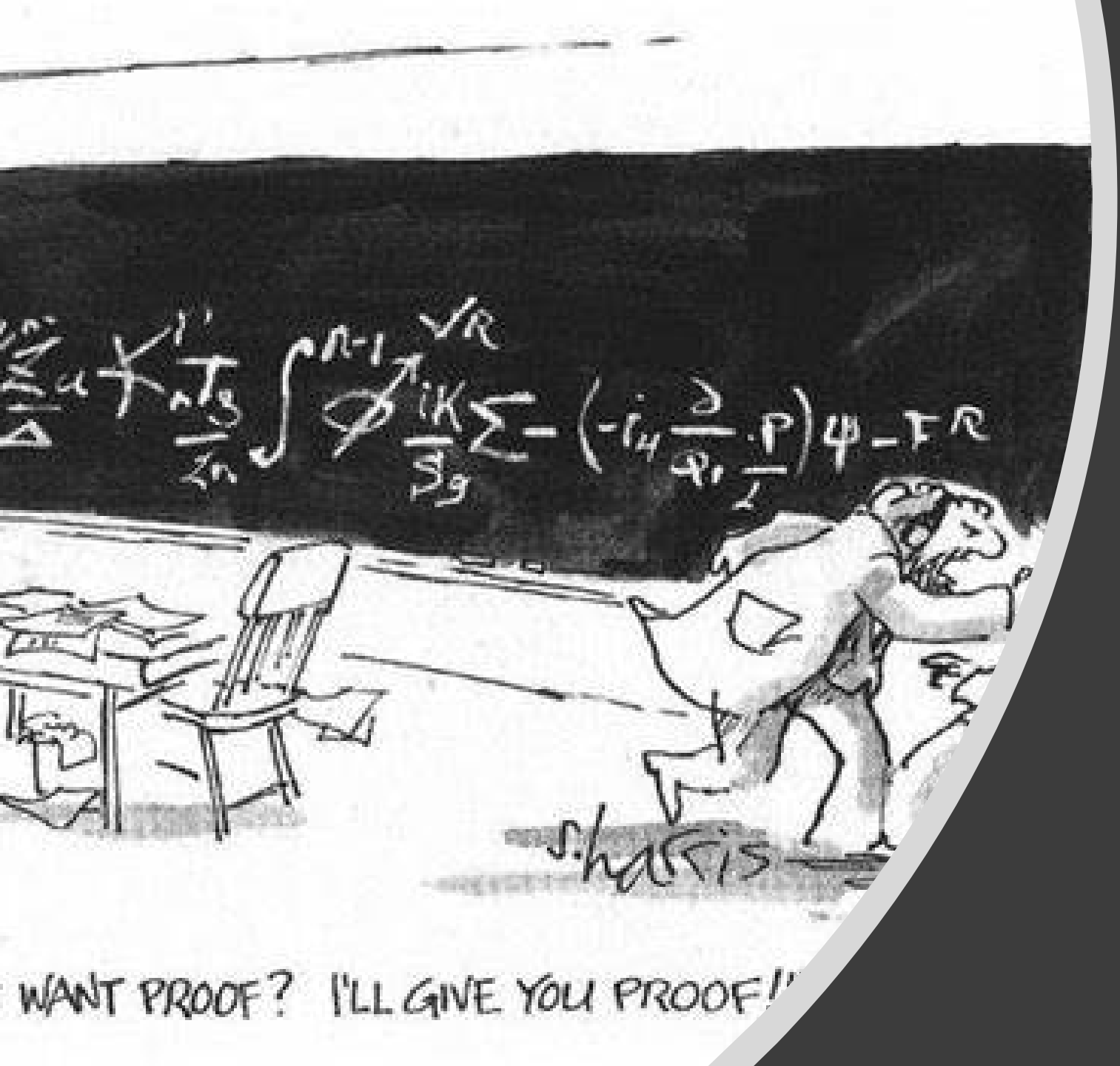
arnold@alarp.com

arnold@alarp.com

Second Law of Thermodynamics



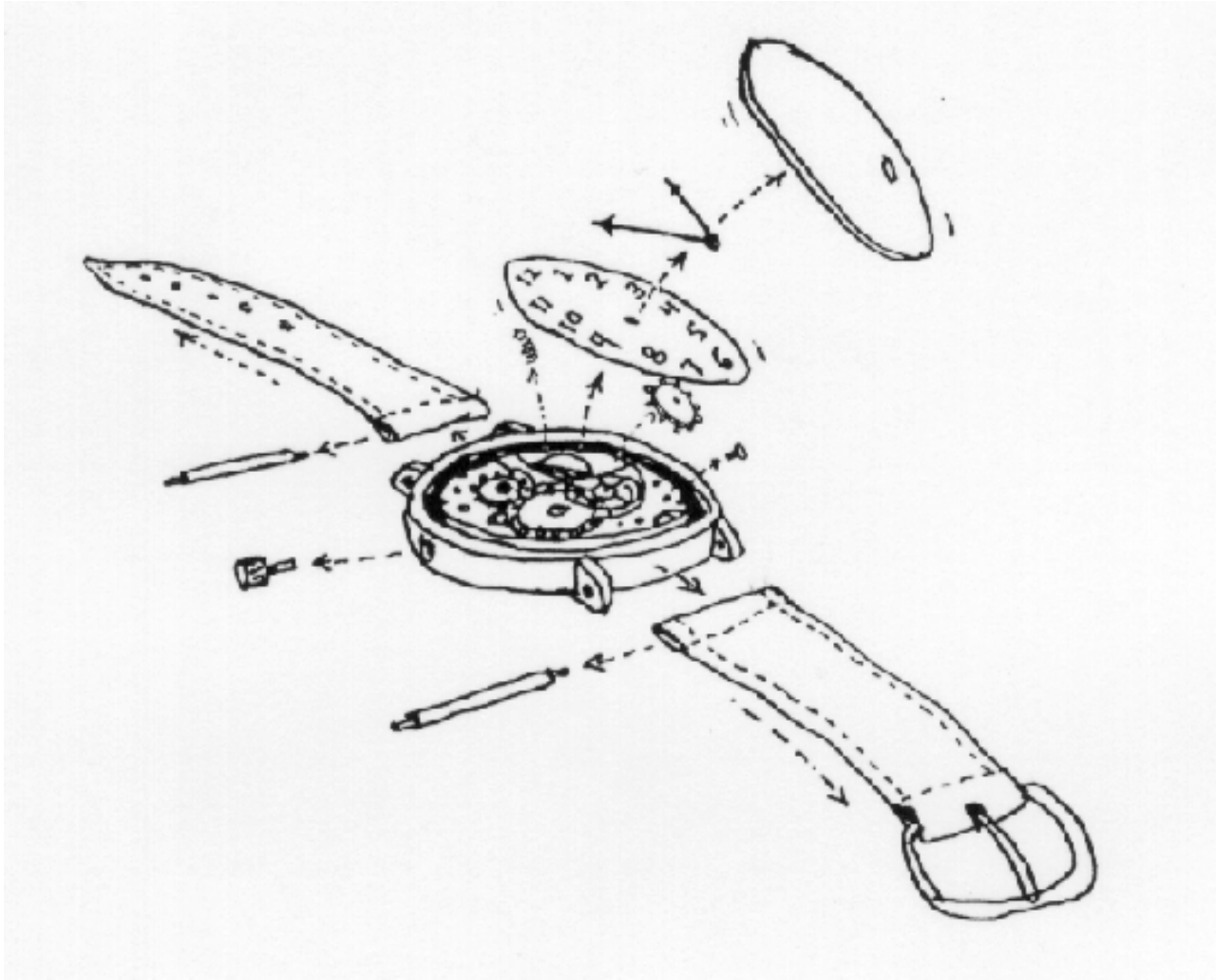
arnold@alarp.com



Aristotles - *"The whole is more than the sum of its parts"*

arnold@alarp.com

Reductionism

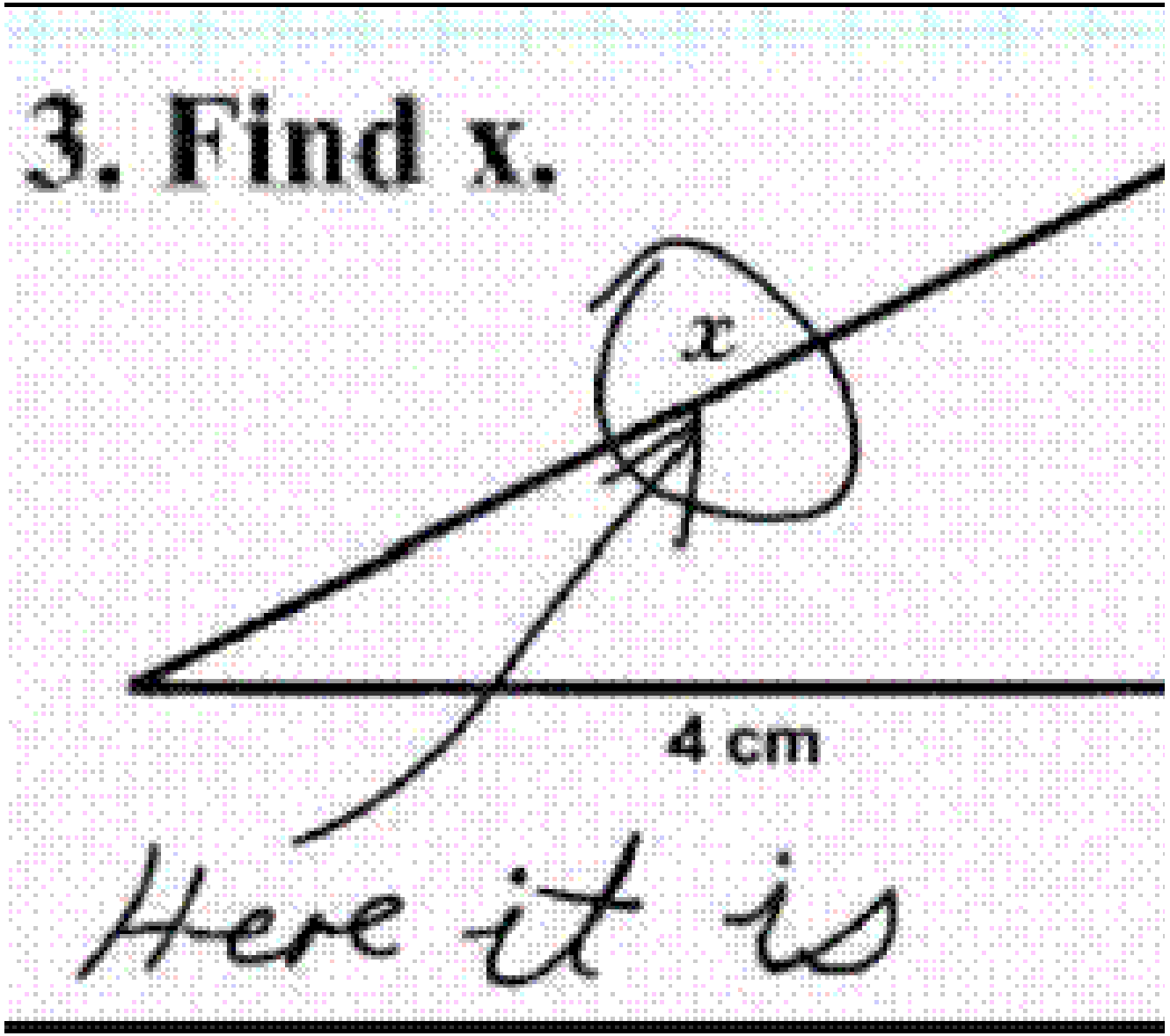


arnold@alarp.com

Fatality Risk

arnold@alarp.com

Oversimplification



Temptation

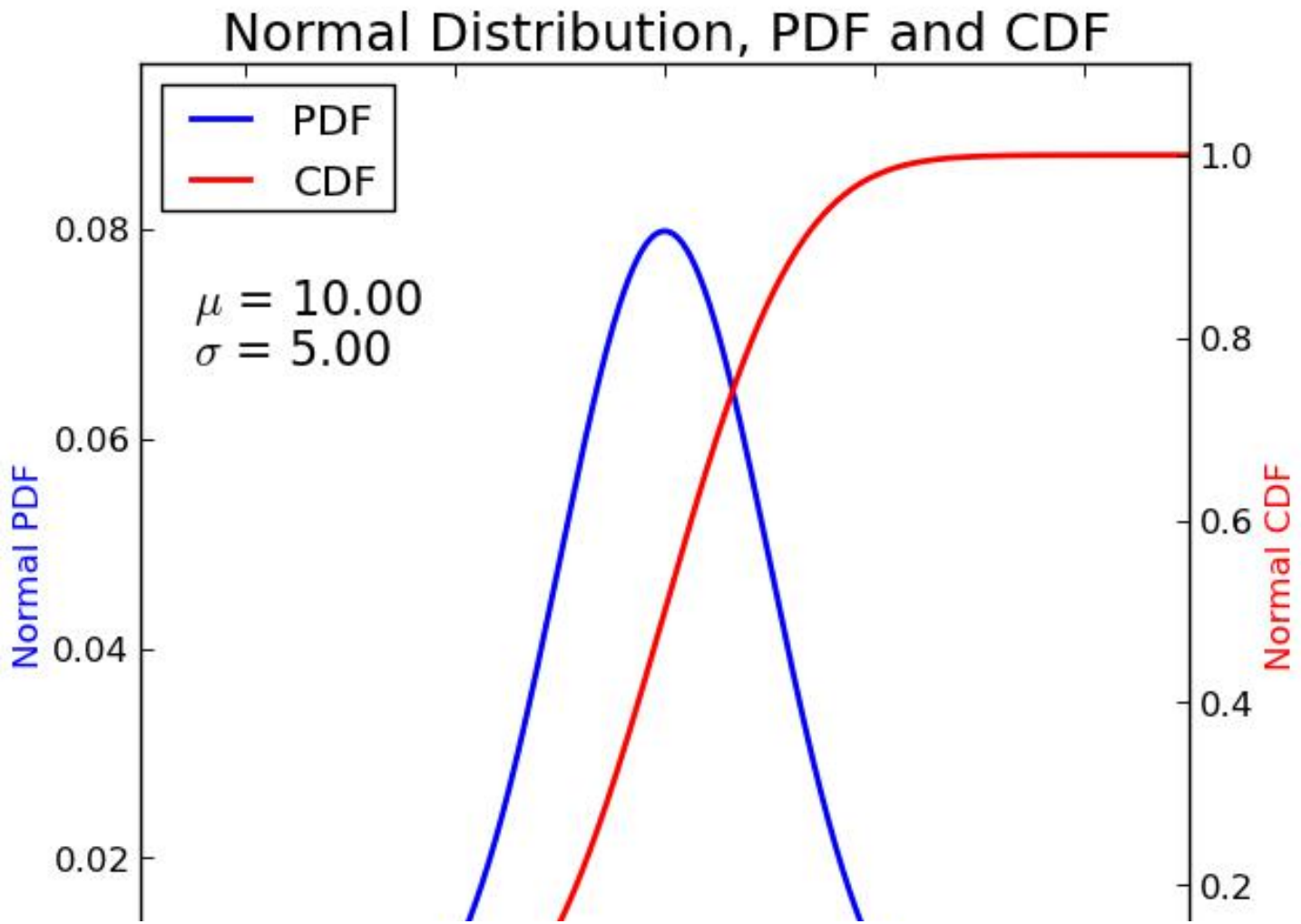
The use of risk based models conveniently distances individuals from personal responsibility for judgement.

If a model concludes a matter numerically, the only human skill required is to compare that numerical result with another.

The human can distance themselves from the decision making by only discussing the numbers generated.

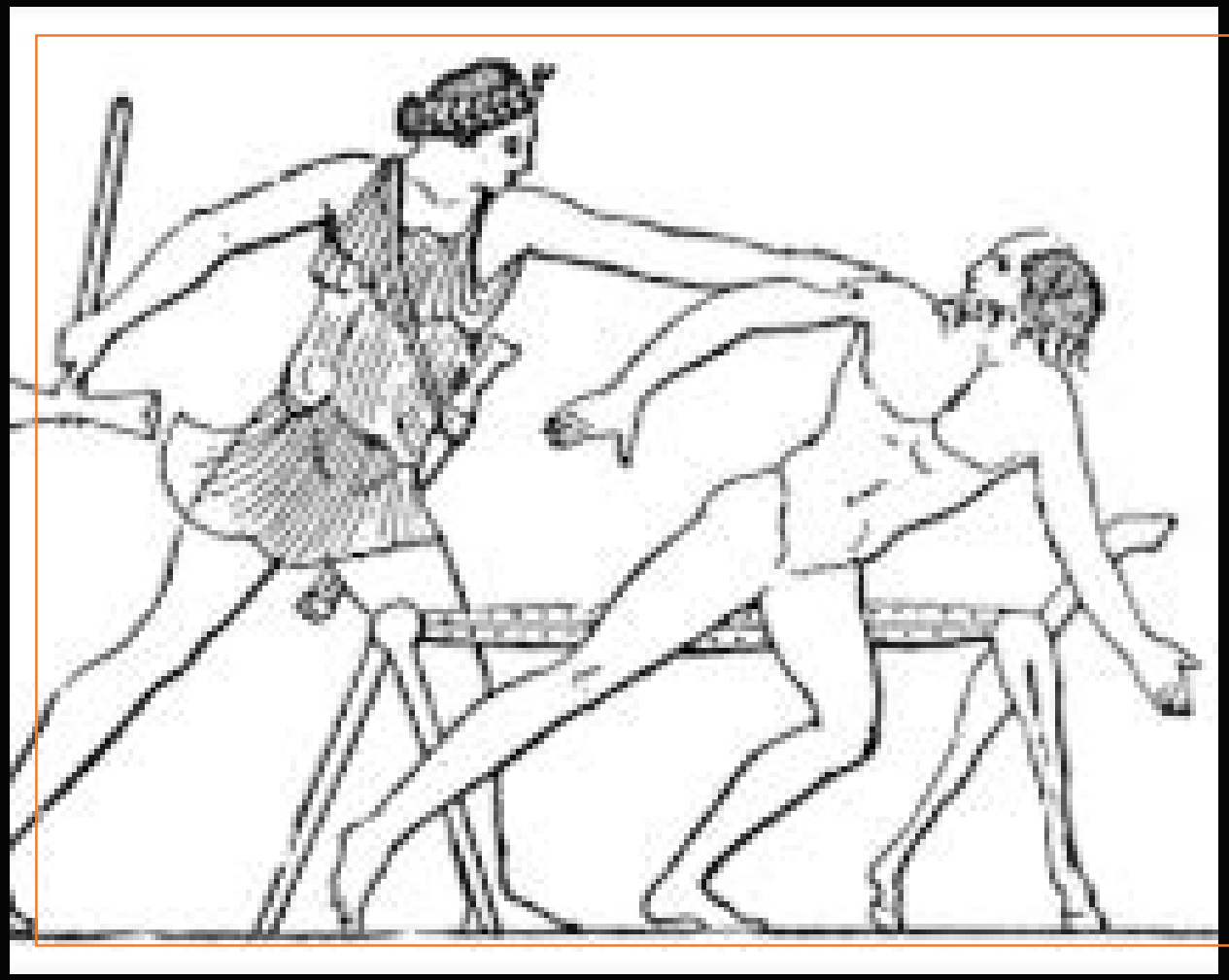
ALARP arnold@alarp.com

Preconceived



Risk Modelling

Low Probability – High Consequence Events



Procrusteans Solution

Cross Passage Separation

Table 1: Cross Passage Spacing per different sources

Source	Cross Passage Spacing – metres
NFPA 130 – Rail [not required where distance between evacuation shafts is less than 762 M]	244
NFPA 502 – Road	300
AS4825 –Rail	240
AS4825 – Road	120
EU Directive 2008/57/EC [European Parliament, 2008] & EC Regulation 1303/2014 [European Union, 2014] Rail	500
PIARC	100 to 500 optional
Japan – Metro Tunnel Standard – Rail [none required]	0

Table 2: Distance between (Road) Cross Passages by country (Minimum Allowable - Metres)

Country	Cross Passage Spacing - metres
United Kingdom – BD 78/99 (1999)	100
Australia – AS4825 (2011)	120
United States of America (NFPA 502)	300
France (Safety Measures in New Road Tunnels – CETU, 2000)	400
China – (JTG F60-2009)	250 to 500
EU Directive 2004/54 updated 7.8.2009; Article 13	Conduct a risk assessment

Conclusions

- Acknowledge limitations in catastrophic tunnel event data
- Resist preconceptions about tunnel safety (over simplification)
- Perform sensitivity analysis on quantitative risk results to help put them in perspective
- Consider the possibility that almost any element of a tunnel safety system can be demonstrated as inconsequential to fatality risk because the risks are so small and our risk quantification techniques so coarse
- Consider that tunnel safety may be more than the simplistic summation of discreet tunnel safety parts

Questions?

arnold@alarp.com