Post-Normal Science and Science in Crisis
(when science is not enough)

Andrew Wood
Conventional Science

- Hypothesis-driven investigations – securely funded, via individuals or small teams
- Example: Nobel-prizewinning work of Sir John Eccles
‘New’ science

- Large teams chasing small amounts of money: multi-institutional collaborations
- Driven by need to show ‘impact’

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Post-normal Science compared to conventional (Funtowicz and Ravetz [1993]).

Normal rules of science do not necessarily apply “speaking in the name of science” to justify particular policy may not be appropriate.
Science in crisis (Saltelli & Funtowicz, 2017)

• 3 specific areas: reproducibility; governance; use for policy.
• Problems:
  – exponential growth in papers;
  – community with high ideals becoming a slave to objective measures;
  – where metrics predominate, practitioners tend to ‘game’ the system;
  – consensus fails where political pressures exist;
  – the myth of value-neutral nature of science.
• Reproducibility issue big talking point (Nature 533:452, 2016)
  – 77% of biologists reported being unable to reproduce someone else’s experiment and 60% were unable to reproduce their own.
Symptoms of science crisis

- Scientists resort to ‘questionable research practices’ including falsification of data (Fanelli, PlosOne, 2009)
- Lack of funding and stable positions for younger scientists lead to desperate measures (Nature, 2015)
- Time pressures lead to poor supervision/results checking by senior scientists (ibid)
- Cherry-picking (‘p-hacking’) of statistically significant results (Nature, 2016)