The fourth age of research

- Four ages of research: the individual, the institutional, the national, international collaboration between elite research groups (Adams, Nature 2013)
- “Science is increasingly a global pursuit, with more and more collaborations spanning national and continental boundaries” (Mitchum 2014)
- Moreover, citation and other measures of impact are greater when researcher collaborate internationally
- “Institutions that do not form international collaborations risk progressive disenfranchisement, and countries that do not nurture their talent will lose out entirely” (Adams 2013)
- “Excellence seeks excellence, so elite national universities are also leading international collaborators” (ibid)
Increase in the proportion of world's papers produced with more than one international author, 1996 to 2008

World and US academic S&E articles co-authored domestically and Internationally: 1990-2010

National Science Board 2012
International collaboration Networks in science, 1998 and 2011

Figure 9.1: Scientific links between Australia and Asian nations 2002 and 2010

Sources: Thomson Reuters (2011a) and Scopus.
The impact of scientific production and extent of international collaboration

Production of scientific research is progressively shifting from individuals to groups, from single to multiple institutions, and from national to international. Because they draw on larger pools of expertise, international research collaborations are more likely to have a bigger impact in terms of citations... Differences across countries suggest a positive relationship between measures of scientific research collaboration and impact... The relationship appears to be stronger in economies with lower scientific production, suggesting the importance of scale, which smaller economies can overcome by participating in global networks.

Policy implications

• Innovation driver of economic development, which is itself increasingly driven by international research collaborations
• With an aging academy in developed countries, there will be intense competition for the best and brightest PhD students and postdocs, driving an international academic arms race
• Internationally shared mega-data: importance of who has skills to exploit Knowledge assets fastest, not who owns them (Adams 2013)
• Appropriate and sufficient incentives to allow universities to participate in international knowledge networks
• Scientific mobility must be a two way street – not just migration from the peripheral to the metropolitan laboratories
• Policy must take account of what motivates scientists
• Academic free trade is becoming, if not already there, the most important kind
Issues for discussion

- Is scientific mobility a zero-sums game: Brain drain, brain gain, brain circulation, or what?
- Can all countries access international research networks – how?
- What factors facilitate or hinder international mobility of academic staff and students?
- To what extent can smaller countries, either at the national or institutional level, participate in international networks and on what terms?
- What factors support beneficial rather than exploitative arrangements in establishing international research networks?

Thank you for your attention