Research
Discovery

Customer/Client
need

Requirement for:
Practice Change
New Strategy

Innovation

New/value adding product, process, service and strategy

Implementation
Research

Uptake, integration etc
3 Types of Biotechnology

- Medical
- Agricultural (Agrifood)
- Environmental (and waste management)
Factors Supporting the Emergence and Sustainability of Medical Biotechnology in the USA

- An entrepreneurial culture
- Availability of venture capital for start-ups
- Positive, long-standing interaction between academia and industry
- Access to relevant (pharmaceutical industry) business and product development skills
- Large and profitable health products sector
Factors Supporting the Emergence and Sustainability of Medical Biotechnology in the USA: cont.

- Companies geared to exporting
- Appropriate “people management” strategies (including informality) for creative enterprises
- Strong basic science infrastructure (NIH as model for peer-reviewed basic science support)
- Supportive and forward-looking government policies
Getting Potential Investors and Partners Interested - Australian Characteristics

- What are the positives to counteract the major issue of size of the sector locally?

  a) Competitive R&D costs
  b) Competitive CT costs; acceptability of data
  c) High quality education and health care system; population diversity
  d) Strong life sciences research base - medical, agricultural & environmental biotechnology

e) Stable political environment; transparent regulatory system
f) Federal and State Government support programs
g) Cultural change re merits of commercialisation
h) Track record in medical instrumentation - Cochlear, ResMed, Compumedics, Axon, Optiscan, Vision Systems, etc
i) Australians are “good collaborators” and “straight shooters”(!)
j) The language is English
Frequently Heard Quotes (Y2002)

a) “Australia is good at basic research, bad at commercialisation”
b) “Australia lacks risk capital and enlightened investors” (Scientist)
c) “Australia lacks investment-ready deals, commercially savvy scientists and an ethos of ROI amongst scientists” (Investor)
d) “Australia’s problems in commercialisation boil down to taxes, people and gorillas”
e) “Careers in S&T are unattractive - bright young people are speaking with their feet”
Frequently Heard Quotes: cont.

f) “Australia can be an international powerhouse in biotech”

g) “Australia’s real biotech opportunities are in agricultural and environmental biotech (versus doing our 1-2% of global medical biotech very well)”

h) “Government support for S&T/R&D is inconsistent, poorly targetted and inadequate; University research is in a parlous state; industry R&D spend is a national disgrace”

i) “State Governments are serious about biotech and the Feds are lifting their game”
Creating asset value

- Quality of underlying science. “Unique twist”
- Technical feasibility and commercial attractiveness. [Grid].
- Management, management, management! Ongoing evaluation
- Matching investment capital with R&D effort. Staged
  - loan; seed, VC and mezzanine capital; public offering
  - Government grants
- Motivation of investors, associates/organisation and investors
- Competitive position. Freedom to operate
- Intellectual property including patents
  - optimisation of IP assets; matching with regulatory approval timetable
  - primacy of US patent system; changes
- Credible business plan with commercialisation targets
- Strategic partnerships
- Asset valuation; technology evaluation. Negotiation capabilities.
Major changes in (biological) research

- Sophistication of experimental methodology; modelling and visualisation science
- Rate at which data are generated; access to information (eScience)
- Linked-up science; multi-disciplinary teams; interface and hybrid sciences
- Relative cost of equipment in a laboratory/Institute budget
- Outsourcing
- Rise and rise of genetics/genomics (+ other ‘omics); nutri-, pharmaco- and meta-genomics (soil, gut, environment)
- Changed societal expectations; TBL; “wicked problems”
- Scientific timeframes = political timeframes
- Reverse mentoring; high premium on youth
- Researchers “facing the market as well as government”; translation; implementation research
- Research quality and impact
- PhD training – broader skills; entrepreneurship
- Strategic relationships
- In vivo → in vitro → in silico → in cerebro!
Pillars of Scientific Research

- Academia and Research Organisations
- Government
- Manufacturing Industry
- Financial (and Legal) Sector
- Philanthropic Sector
## The Science & Technology landscape

<table>
<thead>
<tr>
<th>Type of R&amp;D</th>
<th>Output</th>
<th>Location</th>
<th>Funding</th>
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<tbody>
<tr>
<td>Curiosity-driven basic research</td>
<td>Knowledge</td>
<td>Universities and Research Institutes</td>
<td>Public funds (competitive Grants)</td>
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<td></td>
<td>Technology/IP</td>
<td>Large number of more “applied research” organisations depending on the country</td>
<td>Philanthropic funds</td>
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<td>Value Add</td>
<td>Industry</td>
<td>Financial Sector Funds</td>
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<td>lead</td>
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<td>candidate</td>
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<td>Prototype product</td>
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<tr>
<td>Targeted, strategic problem-solving</td>
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<td>Product R&amp;D</td>
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Curiosity-driven basic research projects often lead to new technologies and innovations. Targeted, strategic problem-solving research, on the other hand, is typically funded by industry and results in products and prototypes. The process is often driven by the need for innovation in specific industries.
… and not to forget

- Luck in science – eg. Fleming and Pasteur
- Trust in science – rarity of fraud, plagiarism, etc.
- Persistence in science – the *Helicobacter pylori* story.