



The World Water Scene:
*Global innovations & world water's
future directions*

*Water Leaders Forum
Singapore June 2009*

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Water will be the beacon of change – an opportunity for leadership

THE CHALLENGES

a global **network** for water professionals



The Challenge

Questions for the Panel

- Can innovation provide the answers for the future of water?
- Can investment in research provide the next 'big solution'?
- What barriers are there to uptake in innovation?

a global **network** for water professionals

Recent innovation reviews

- Most recent – Australian innovation reviews (2008)
 - Dr Terry Cutler – ‘venturousaustralia’
 - Prof Mary O’Kane – ‘Collaborating to a Purpose’
- FEAST review of Australian cooperation
 - A Bibliometric Analysis of Australia’s International Research Collaboration in Science and Technology: Analytical Methods and Initial Findings

Questions

- Sources of innovation - what are they?
 - Are they adequate?
 - Is there scope for non-university innovations?
- What sort of investment is best?
- What is required to get a technology adopted?
 - Does the best technology win?
 - Adoption by industry or popular use - are there different strategies?

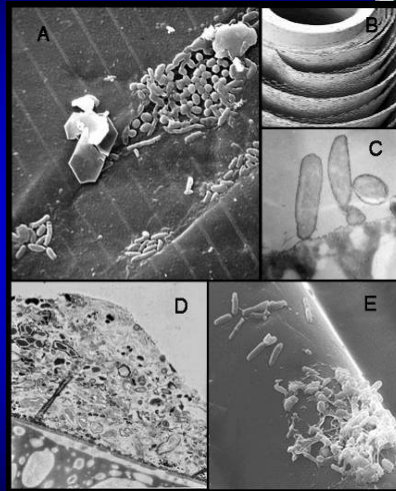
The membrane story



The Membrane Story - simplified

- 1970 - fundamental R&D
 - New polymers/new theory/manufacturing challenges
- 1980s -
 - Applications for industry
 - Applications to water treatment
- 1990s - applications to Reverse Osmosis
- 2000s - applications to wastewater treatment
- 2010 - new developments in membrane efficiency

A next challenge?



Biofilm microcolony blocking pores on a reverse osmosis membrane after 3 days of water filtration



Rack of 16 x B30R modules





Fouled Feed Spacer

Back to basics?



- Basic R&D on membranes (1970)
- Applied R&D on membrane systems (1980)
- Intensive industrial R&D on applications (1990)
- Competitive marketing of new products (2000)
- New technology to achieve the new vision - 2000s
- New control technologies – physical, chemical & operational
 - Quorum sensing – basic R&D
 - Genetic manipulation – basic applied
 - Dispersion mechanisms – applied
 - NO as a control mechanism – new technology (EBCRC)

Halving the energy to produce fresh water from seawater



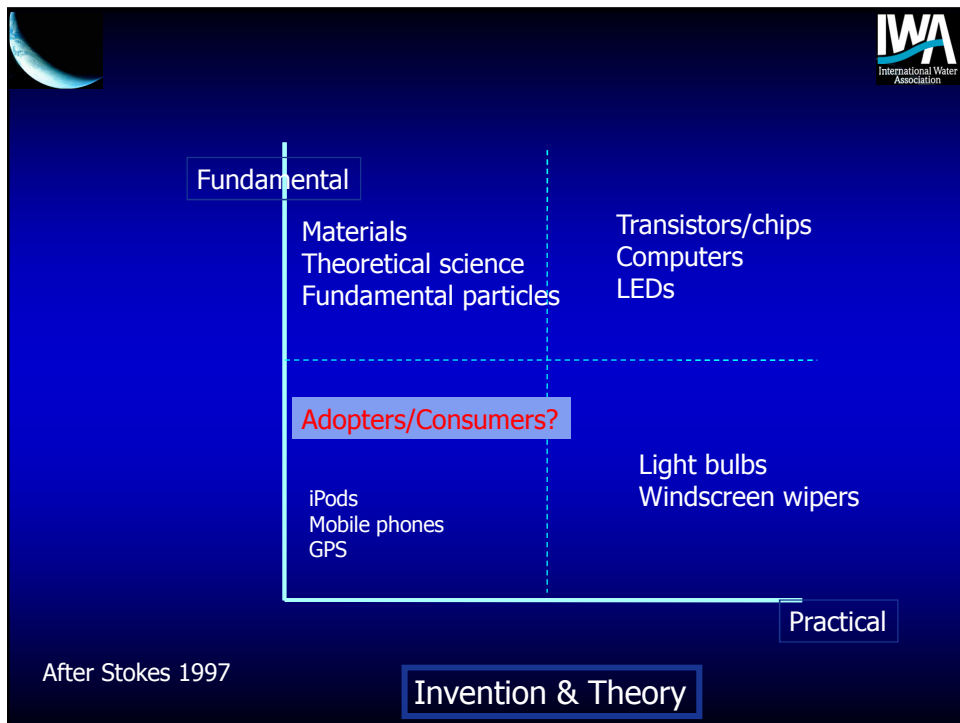
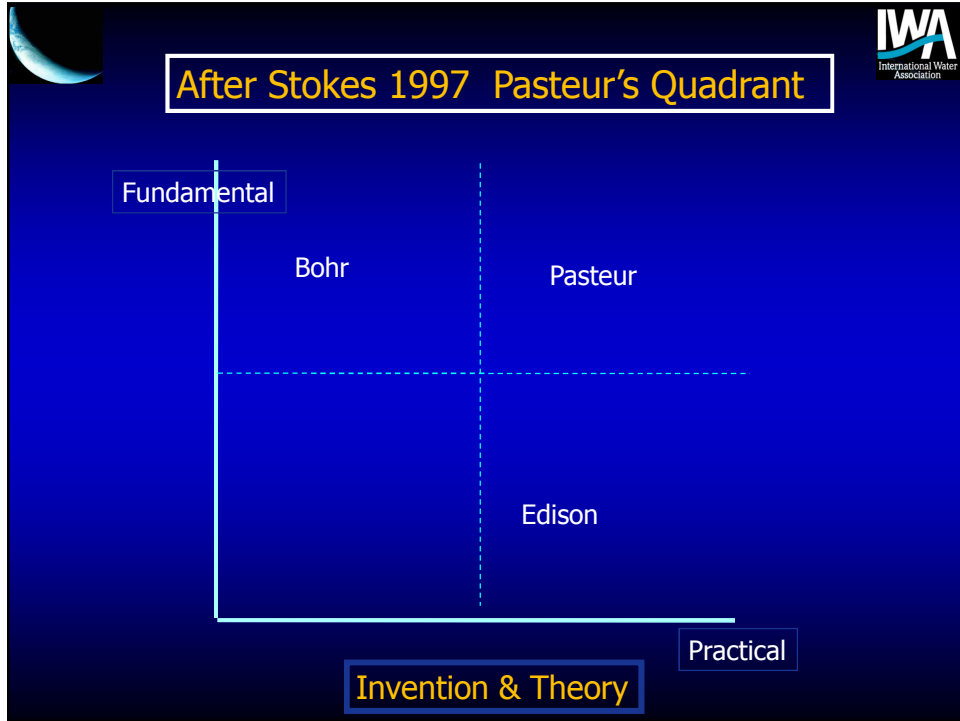
Adoption & Uptake

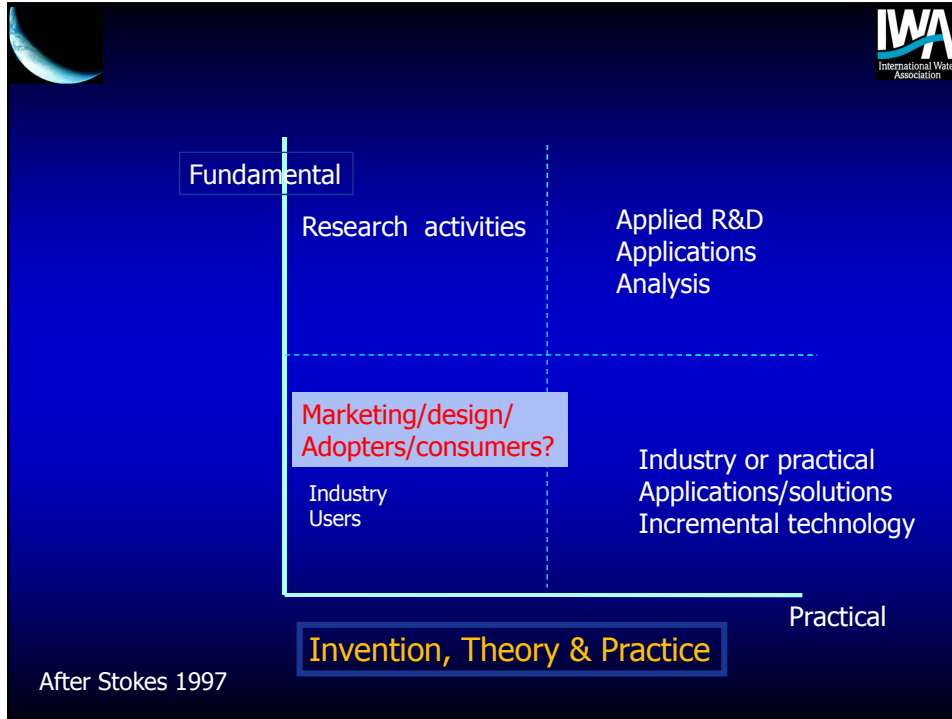
- The model of linear innovation progression from pure through applied to adoption is no longer accepted as valid
 - Parallel progress is viewed as an optimum model
- Just as the innovation model is not linear the adoption model also not linear
- Sustainability adoption is similar to innovation adoption



Model Adaptation

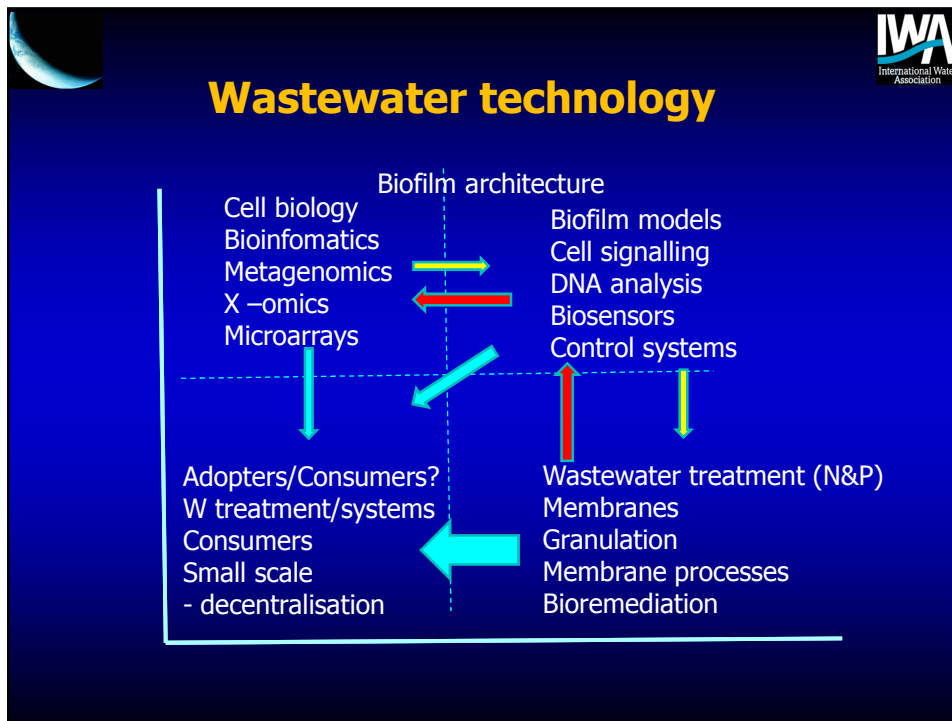
- D E Stokes ' Pasteur's Quadrant; Basic Science and technological Innovation', 1997
 - an economist – dealing with scientific innovation and investment in the Roosevelt administration (1944)
 - Developed from ideas put forward by Vannevar Bush
 - considers the various models of innovation
 - proposed a simple model - the Pasteur Quadrant

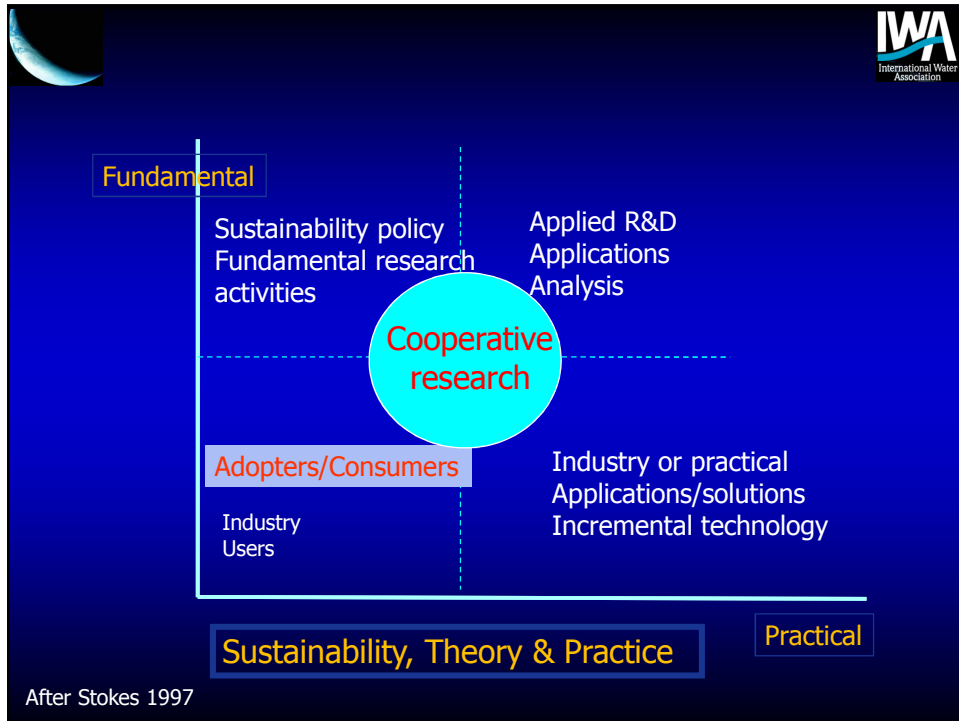




After Stokes 1997

Wastewater technology





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- ## Challenges - optimisation
- Sources of innovation
 - Fundamental Research
 - Applied R&D
 - Edison's successors
 - Cooperative R&D
 - Reduction/management of 'excess' information
 - Smart systems
 - Smart people
 - Conversion of data to information & systems
 - Challenging policy for uptake & adoption



Innovation & sustainability – making them work

- Clearly articulated challenges
- Vision for outcomes & applications
- Persistence to follow through
- Flexibility to adapt with new information
- Communicating & marketing outcomes



Innovation Priorities

- Investment in all forms of R&D
 - Fundamental - Universities; specialist centres
 - Applied – cooperation & linkages
 - Industrial demonstration & development
- Incentives for translation & adoption
- Assistance with commercialisation

How to achieve?

- Researchers want money, freedom to innovate, publications and international peer linkages
 - but how do we protect IP
- Industry wants simplicity – the best outcomes for the least cost
 - But there are real barriers to adoption
- Users want convenience – they don't have to know how it works – just think they do
 - It just has to appear as value for money
- Marketeers require a selling point or value proposition
 - Or how will it be valued? – image; cost effectiveness; convenience; fun?

Discussion points

- Fundamental R&D as key to future sustainability?
- Applied R&D is an intermediate route to market?
- Coherent routes to market are missing?
- Technologies are converging to address industry needs – not just research needs
- Funding could stimulate the faster production & adoption of these - but what is best model?
- Adoption requires investment & incentives across all markets and aspects of adoption – by whom?
- Is internationalisation a key aspect of innovation?



International Water Association IWA

The water professionals network

<http://www.iwahq.org>