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TANAKA BUSINESS SCHOOL

Tech Transfer: Thrills, Pains and Chills

Prof. Gerry George

Director, Rajiv Gandhi Centre

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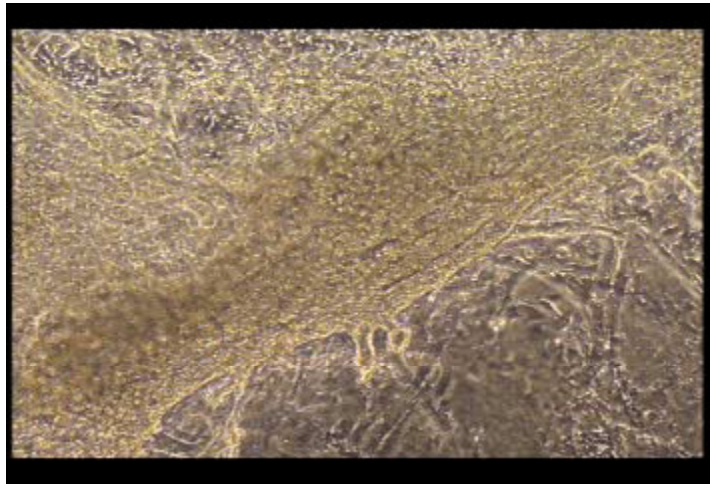
The Thrills



- Technology getting out there
  - Being used!
  - Creating value
- The difficult choices are in
  - Finding the market – what is best use?
  - Appropriating value – how much?
  - Rights – who gets it?

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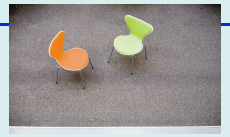
Making great ideas valuable

Working with inventors you need to apply an institutionalized process…..

Stage 01 Sourcing ideas Market application	**Stage 02** IP Protection	**Stage 03** Proof of Concept Product Development	**Stage 04** Licensing	**Stage 05** Formation and incubation of technology businesses	**Stage 06** Investment	**Stage 07** Exits
						

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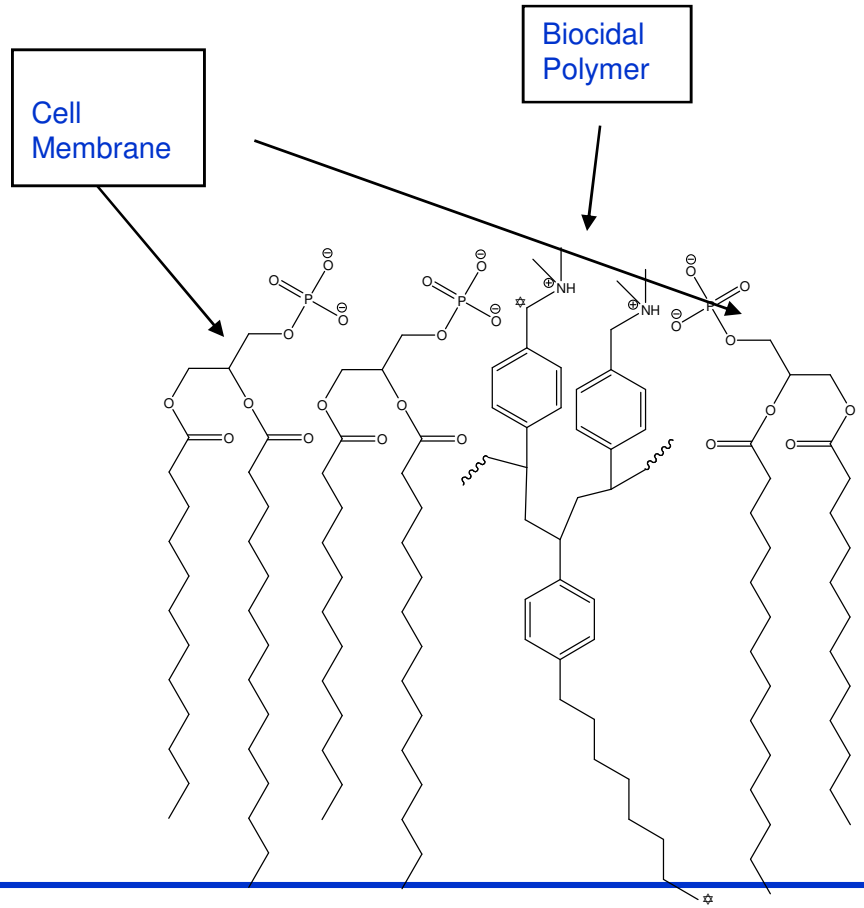
The Chills: Now which market?



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Where to look?

- Biocidal polymer
- Low concentration requirement
- High efficacy (kills everything; incl human cells)
- Can be modified for stability
- Can be modified for substrate specificity

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Still cold?

- Market (application)
- Industry (competition)
- Value (capturing and sharing)

- License?
- Start-up?

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Wisconsin Alumni Research Foundation

- Founded in 1924

- Invention of Vitamin D
  - Prof. Harry Steenbock (Biochemistry)
    - Using $900 from 9 alumni of UW
    - University should not participate in private benefit of public good

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Steenbock's guidance

- Support excellence in research
  - Willingly and without encumbrances
  - Discourage complacency and encourage action
- Attract and retain high caliber scientific talent
  - Incentives to invent
- Invest in the infrastructure
  - In people
  - In assistance
  - In facilities

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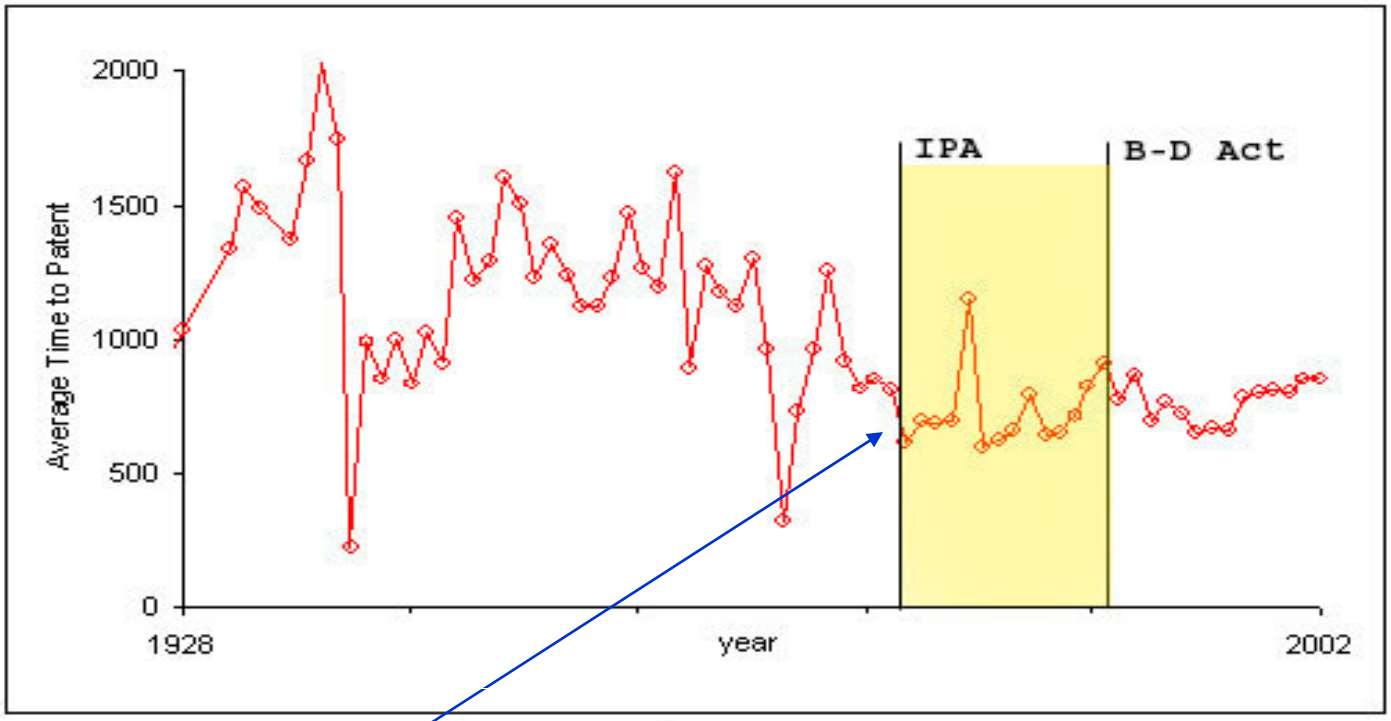
Pushing the Core

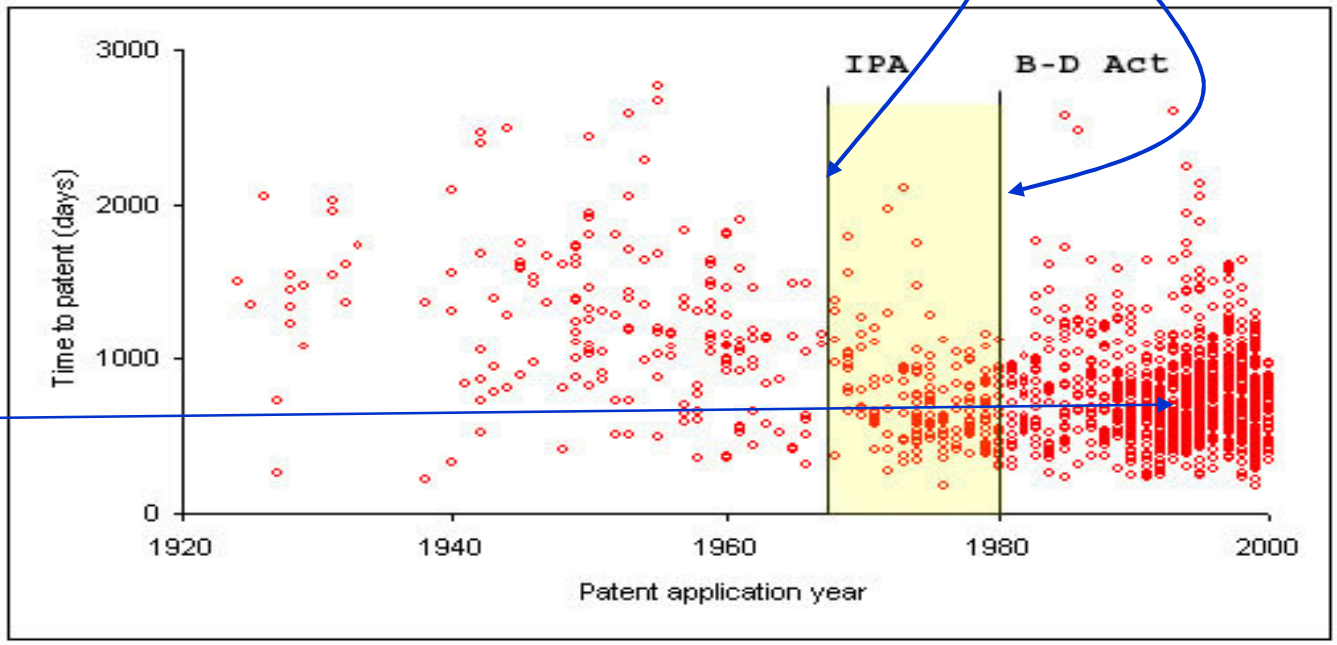
- Patenting and licensing
  - Performance is stellar with licensing of 2 inventions
    - How did these two inventions become stellar?
    - What did WARF do to make these two runaway successes?
- Non-core capabilities

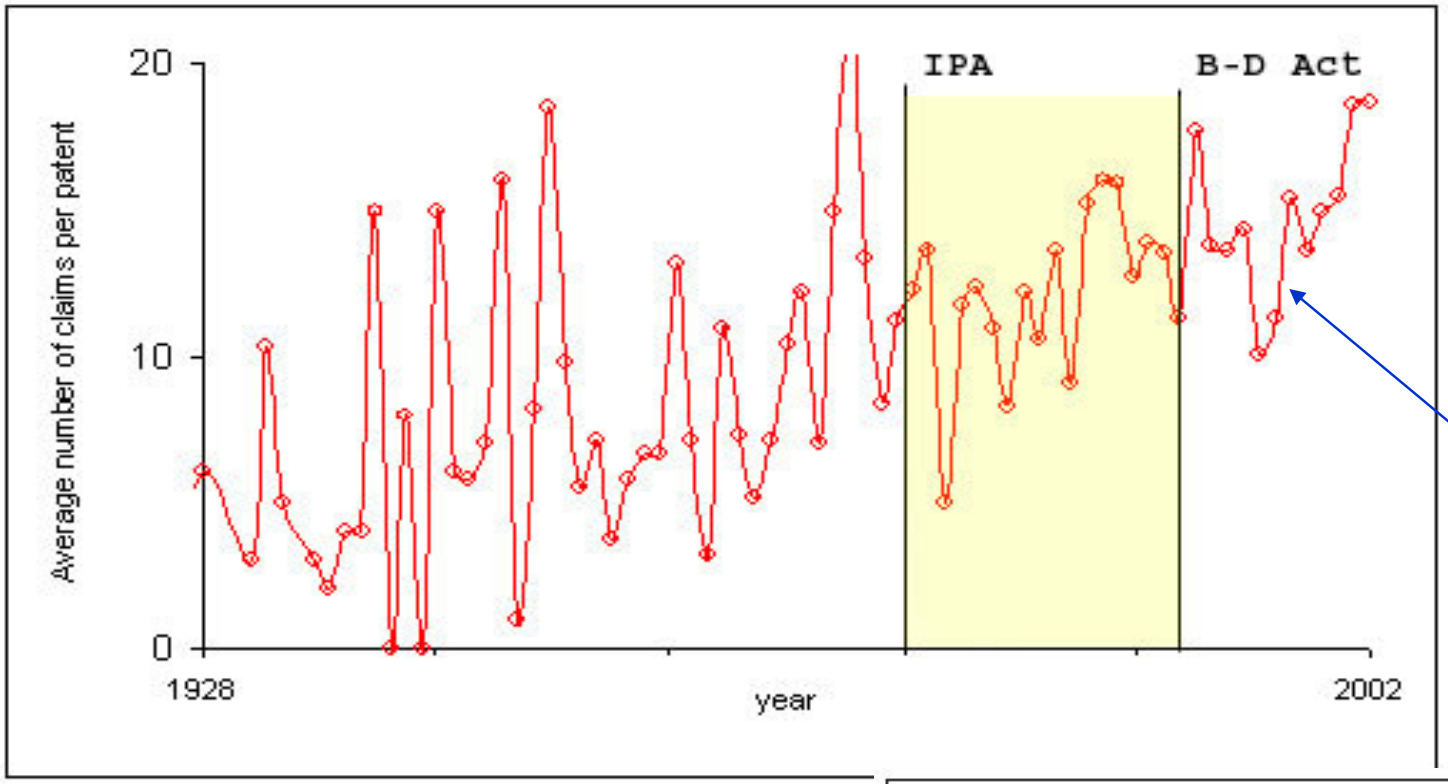


Exogenous Regulatory Events

Average time decreases

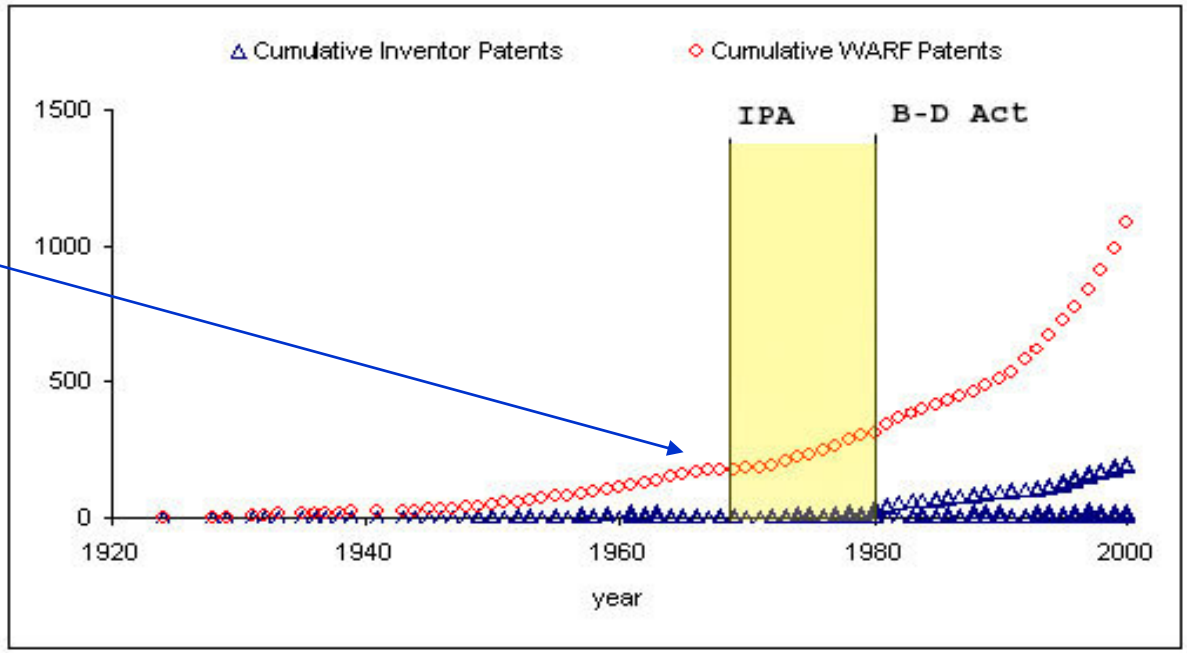
Variability decreases





Claims increase

Portfolio increases



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Graphic inferences

- Reduction of variance in time to patent
  - Becoming better at a single core capability
  - Inferring learning within core capability

Mean	Variability	Difference (t-test)
1244 days	587 days	
771 days	347 days	$p<.001$
750 days	314 days	$p<.06$

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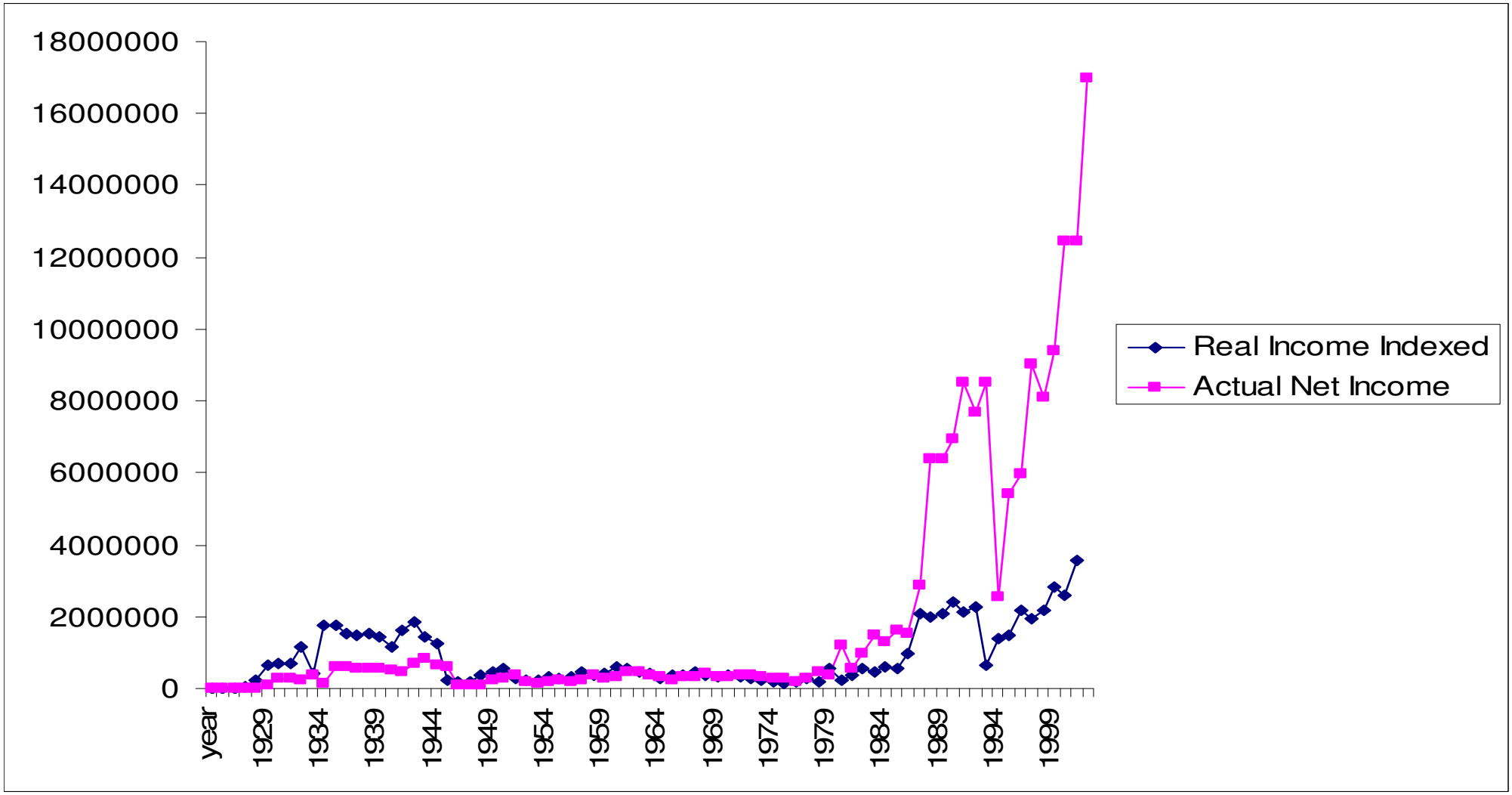
So what about income?



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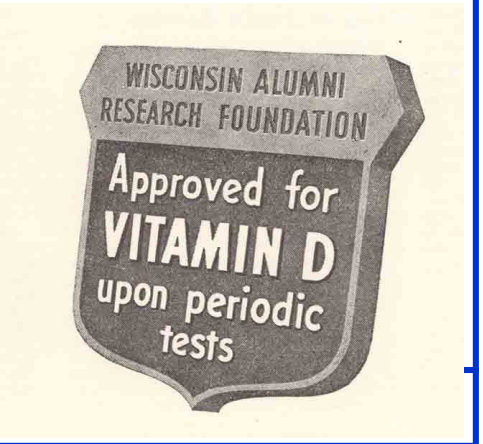
The first invention – Vitamin D

Create Demand

Create Brand

Protect Demand



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What else did WARF patent?

- Vitamin D
- Vitamin K
- Copper/Iron Complex for anaemia
- Warfarin (Coumadin)
- MRI
- Silicon heat dissipation
- Human embryonic stem cells

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Leadership

- Entrepreneurial activities
  - Marketing
    - Increase demand
  - Legitimation
    - Prevent abuse
  - Certification
    - Increase visibility
- Institutional Environment
  - Supportive tax and foundation laws
- Market Environment
  - Need for Vitamin D
    - Rickets

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Being Entrepreneurial in Technology Transfer

- Entrepreneurial expositions and leadership
  - Vitamin D testing labs
  - Warfarin rodenticide testing
  - Wurster process roll-out
- Institutional changes
  - Tax and foundation laws
  - Patent laws

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So who were these leaders?

- Russell (1924 – 1939)
  - Dean, Agricultural Science
  - Scholar and visionary thinker in science and society
  - Supported by a ‘few good men’ as trustees
- Ross (1940 – 1969)
  - Attorney, joined as patent counsel in 1933
  - Built up experience under Russell
- Rosten (1970 – 1976)
  - Was accountant; managed finances and endowments under Ross
- Pike (1977 – 1992)
  - Outside hire, economist and keen interest in financial portfolio
- Leazer (1993 – 2001)
  - CEO of a mid-sized biotechnology company
- Gulbrandsen (2001 -)
  - Legal background, entrepreneurial

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How does leadership play into this?

- Leadership effects
  - Investing in opportunities
  - Learning from rare events
  - Being entrepreneurial
  - Resource-constrained
  - Making contacts – networks
  - Listening!

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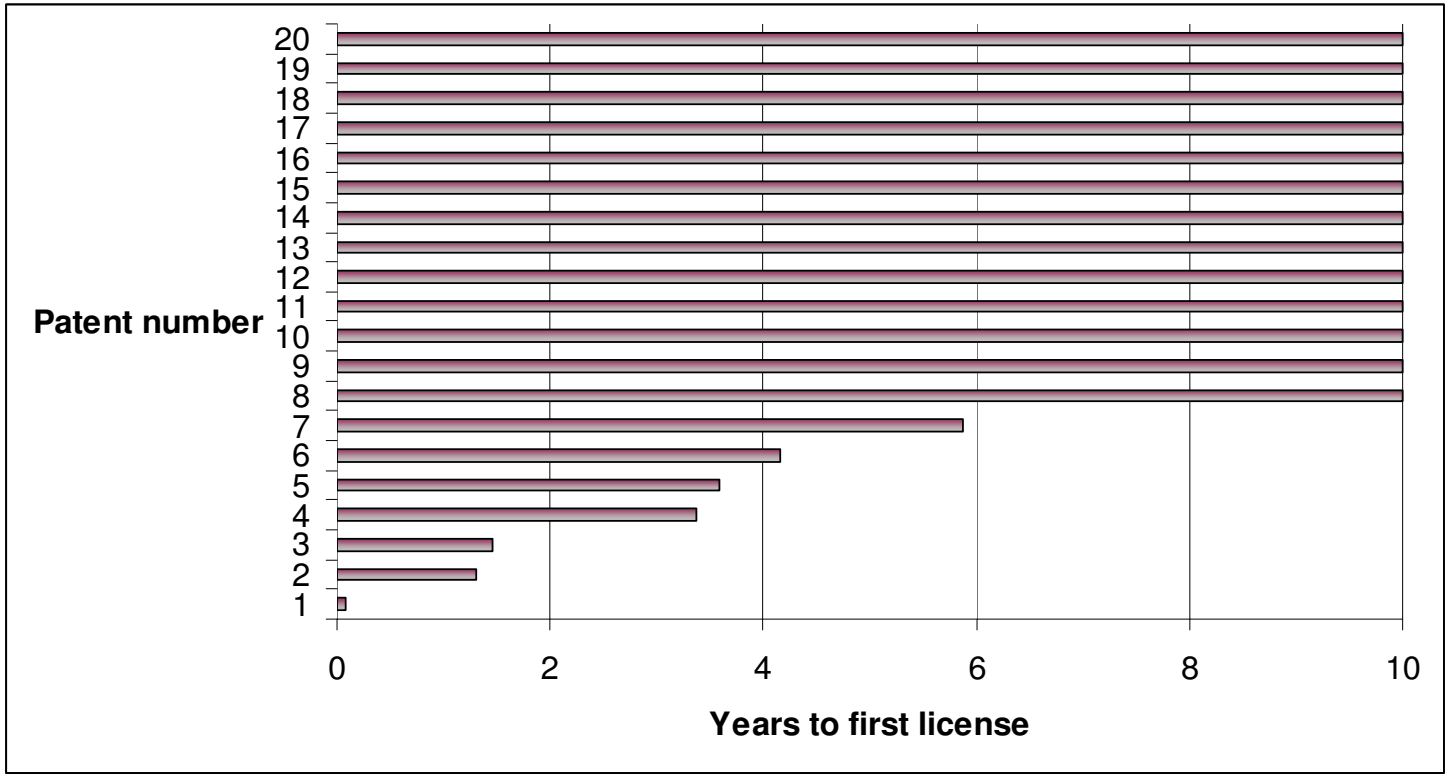
What gets licensed?



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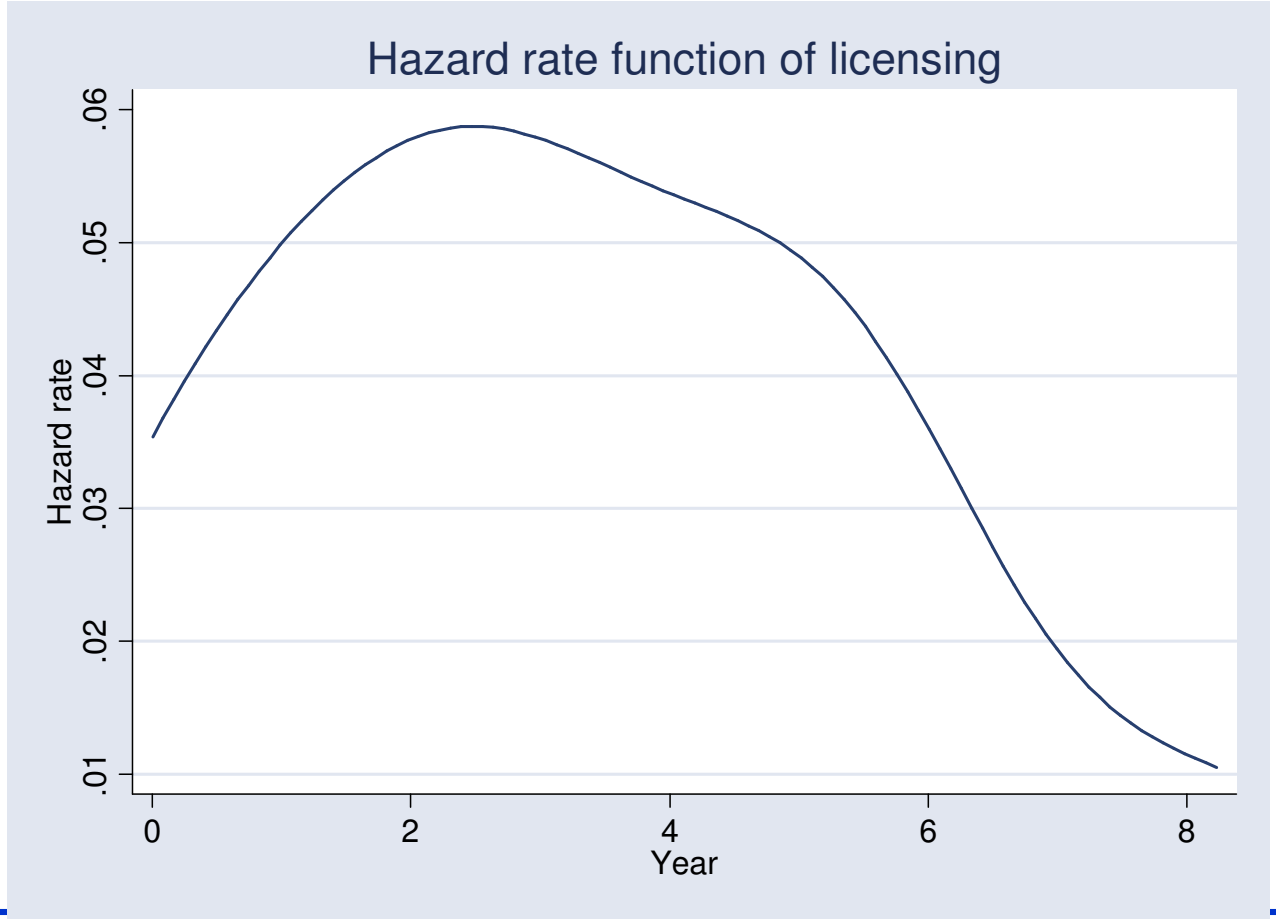
Probability of license?



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At what cost?

- Average cost to patent $23,445
- Average cost to license $30,570

- Average cost of licensed patent $54,015
- Average cost of unlicensed patent $33,415
- Average years to license 7.49 years

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Tips and Solutions

- Focus on..
  - Finding markets
  - Creating value
  - Incentives for entrepreneurship
- Don’t bother too much on
  - Trying to get the most money on each deal
  - There is no best deal!

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Imperial Innovations Group plc

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Overview – Imperial Innovations

- AIM Listed, market capital US$440m (raised US$130m)
- Technology transfer, incubation and investment
- Based at Imperial College (52% owned)
- Portfolio:
  - projects (21 initiated 06/07)
  - 133 commercial 328 patents under management (77 filed 06/07)
  - >50 proof of concept agreements (47signed 06/07)
  - 74 technology businesses (13 formed 06/07
- Team 48 people
  - IP management, product development, market assessment start up and investment

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Imperial College – majority shareholder and core source of ideas

•Source Technology •Development of product ideas	bp, Johnson & Johnson Services, Inc., Lilly
•Incubation start ups	Carbon Trust, wrap
•Commercialise corporate IP	GlaxoSmithKline, BAE Systems
•Bundle opportunities – facilitate development partnerships	NHS, UK Universities, NPL National Physical Laboratory
•Co-investors	novo nordisk, Tudor Ventures, PartnershipsUK, Consensus Business Group
•Facilitate links into India	Rajiv Gandhi Centre, imperial innovations i2india

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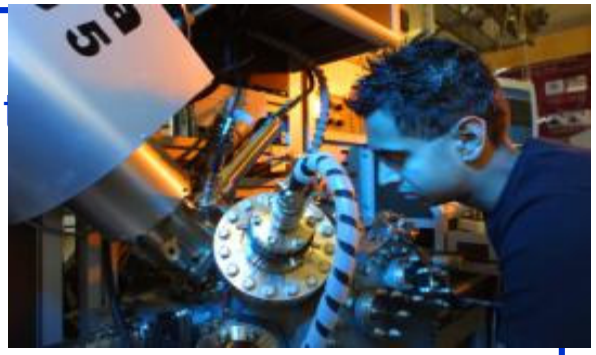
i2india



- Replicate Imperial Innovations UK activities – bespoke
- Formed by Imperial Innovations Group with
  - Chairman – Chris Matthias
  - Vice Chair – Rajan Pandhare
- Prestigious Advisory Board guiding strategy
  - Chair – Dr Tidu Maini
  - Dr R A Mashelkar
  - Donald Peck
  - D.S. Brar
  - Graham Wrigley
- Established with US$3m seed funding
- Initial presence in Bangalore, Delhi and Mumbai planned
- Rajiv Gandhi Centre will be a focus for networks, education, entrepreneurship and innovation - i2india will provide commercial platform

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Examples – Interaction with India

Shapoorji

US$1m proof of concept to invest in bioscience and engineering technologies

Polytherics

Partnering with Shantha Biosciences to ensure cost effective drug development

Engineering corporate IP

New company with UK/Indian management team, European and Indian base, Product development/production in India, fund-raising in UK

PSE

Agent for NCL spin-out - plan to establish PSE India

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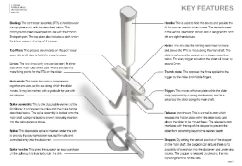
Technology case studies

- **Smart Surgical devices**
  - 5 surgical tools arising from biosurgery dept (St Mary's)
  - Smart Boogie, Laparoscopy port
  - Prototypes developed with the Royal College of Art



- **Tournistrip**
  - Disposable, cheap to produce Tourniquet device
  - Proven to reduce infections in hospitals
  - Generating interest and orders

- **Novel Neuropathic Pain Therapeutic**
  - Neuropathic or chronic pain - high unmet medical need.
  - Equivalent efficacy to compound Gabapentin in 3 different models of neuropathic pain

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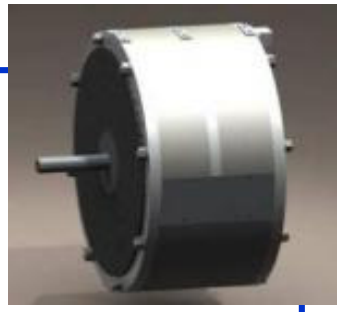
Engineering

- **EVO Electric**
  - High performance electrical motor/generators
  - Results in lower weight, smaller size and higher powered electric vehicles
  - Used in gensets, powertrains and as traction motors



- **Novacem**
  - Range of cement binders based on magnesium oxide
  - Does not require high temperature processing
  - Sets and hardens by absorbing atmospheric CO_2
  - Produce 'carbon negative' construction products

- **Carbon Fuel Cell**
  - Carbon-air fuel cell using….
    variety of carbon-containing fuels (e.g. coal/biomass)
  - Resistant to poisoning
  - Very high efficiency power generation
  - Stream of pure CO_2 gas suitable for sequestration

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i2india

Intend to partner :

- Indian research institutes, universities and research organisations
  - Commercialise ideas
  - Funds for IP, proof of concept and seed investment
  - Evaluate technology opportunities, form companies, raise investment
- Corporates
  - Commercialise and incubate non-core ideas
  - Manage proof of concept, early stage funds
- Bring Imperial Innovations Group technologies to India
  - Licensing to Indian companies
  - Start-ups establishing joint ventures or spin-offs in India
  - Development partners and customers