Intellectual Property: *Catalyst or Contaminant?*

Science, you and the Economy

Ian Harvey

Chairman, x-lab IP Centre, Tsinghua University, Beijing

Adjunct Professor, Imperial College, London

July 10th, 2019

THE ROYAL SOCIETY

v3

Ian Harvey – Background

- **1960s: Engineer by education, training and experience**
- **1970s: World Bank – Asia and Africa**
- **1985-2004: BTG CEO**
  - **patenting and licensing publicly-funded research from universities and government-funded research**
  - **understanding role of seminal research in creating truly innovative products**

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A patent gives you the right to use your invention

True or False?

© Ian Harvey

Should a researcher undertake a patent search before starting research?

Yes or no?

© Ian Harvey

Actress – “Ekstase” - 1933

What did she do that affects all your daily lives?

© Ian Harvey

“Future competition in the world is competition in IP ….”

Who said this – and why should we take note?

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Erbium-doped fibre amplifier

What does Prof Sir David Payne, FRS, think about IP?
(his research enabled long-haul optical fibre and enabled the internet)

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Three revolutions:

- **Steam**
- **Electricity**
- **Software**

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John Roebuck FRS

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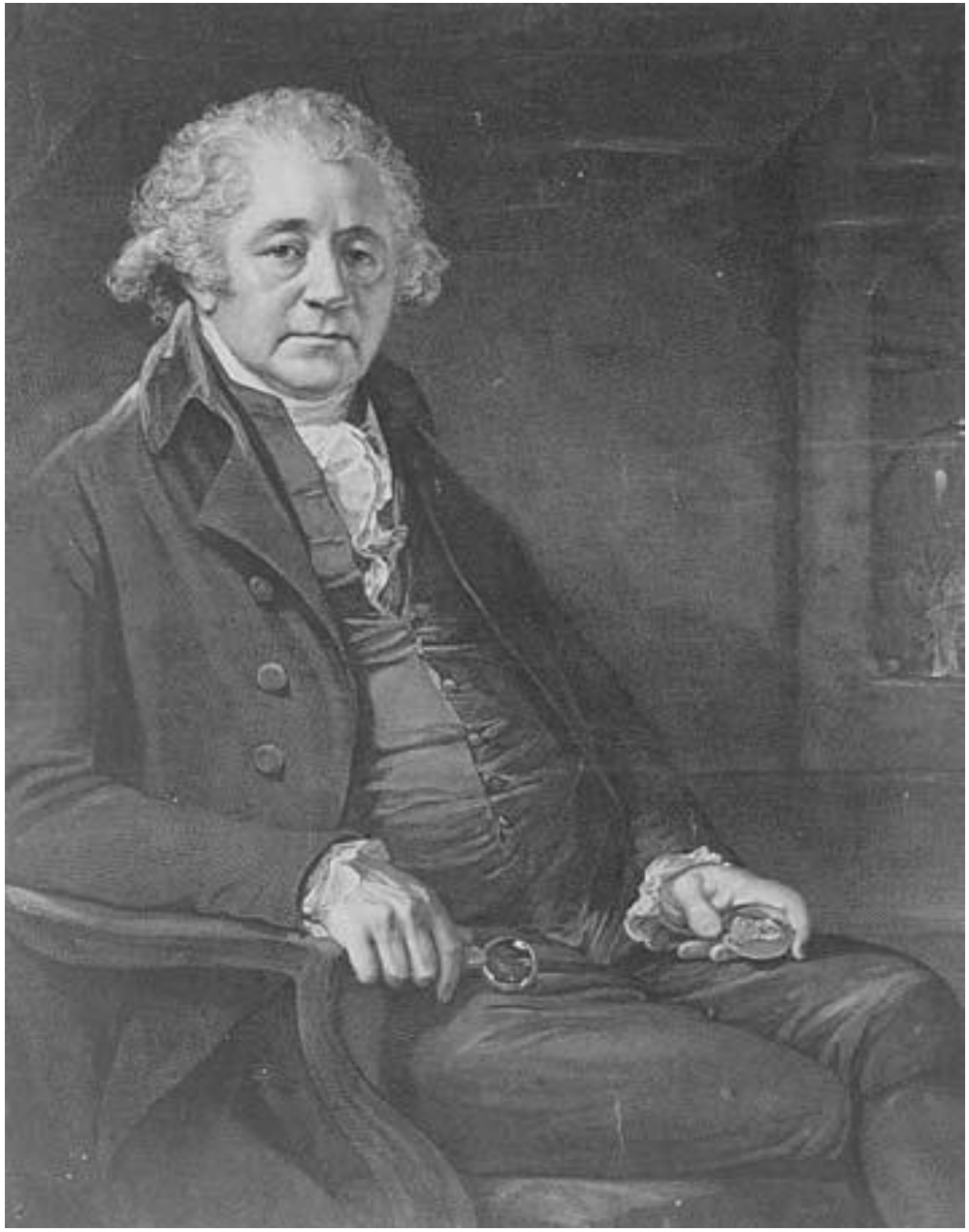

Matthew Boulton FRS

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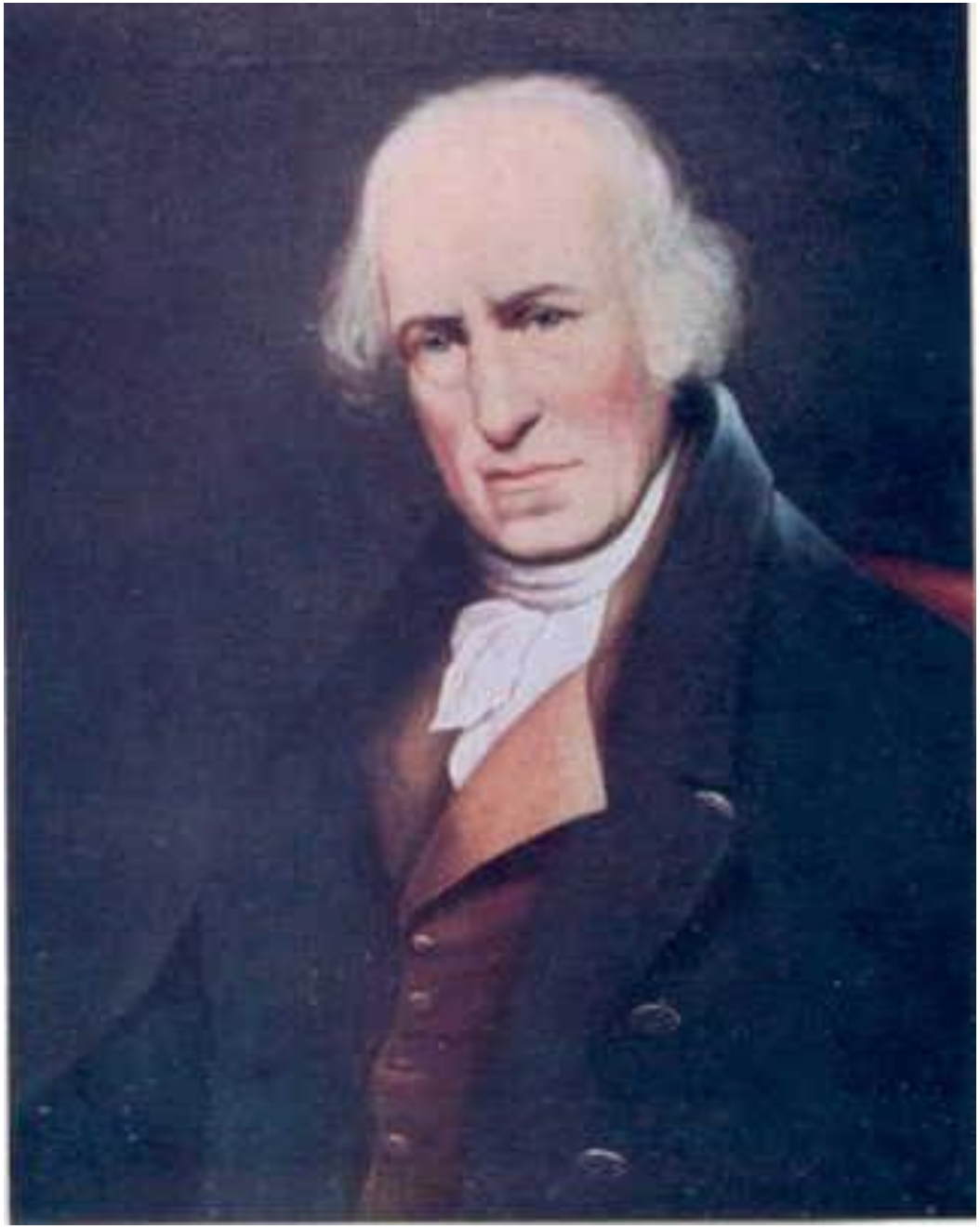

James Watt
FRS

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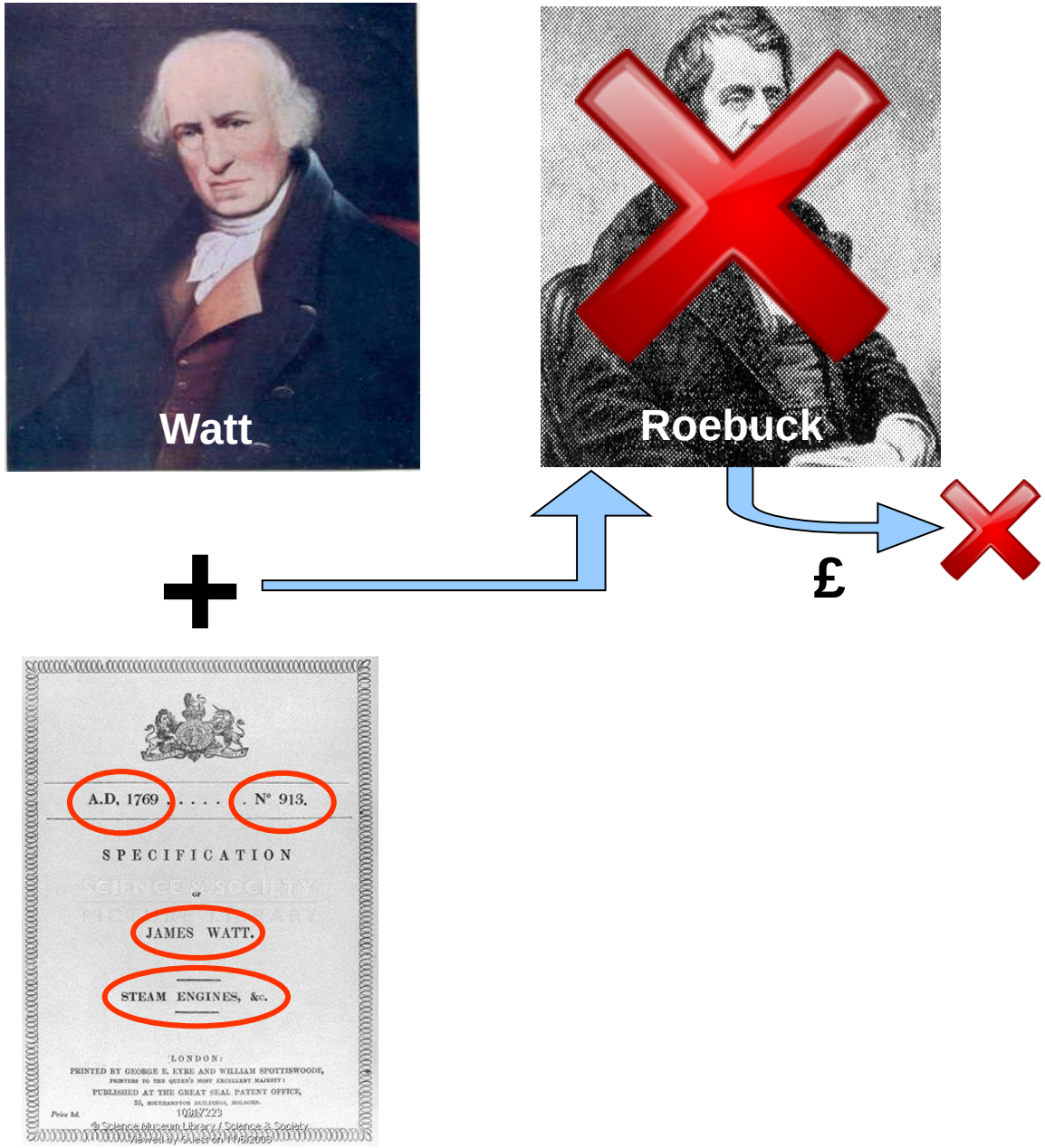
Watt
Roebuck
£
A.D, 1769 . . . . . Nº 913.
SPECIFICATION
OF
JAMES WATT.
STEAM ENGINES, &c.
LONDON:
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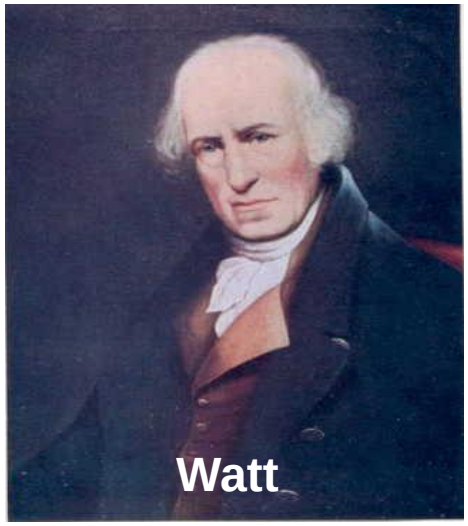
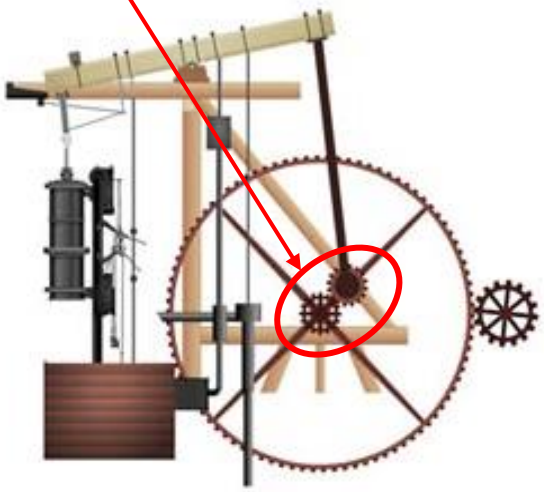


Sun and Planet (epicyclic) drive avoids Pickard's crank patent



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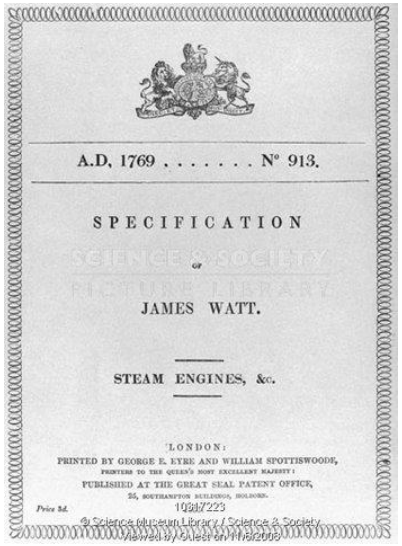

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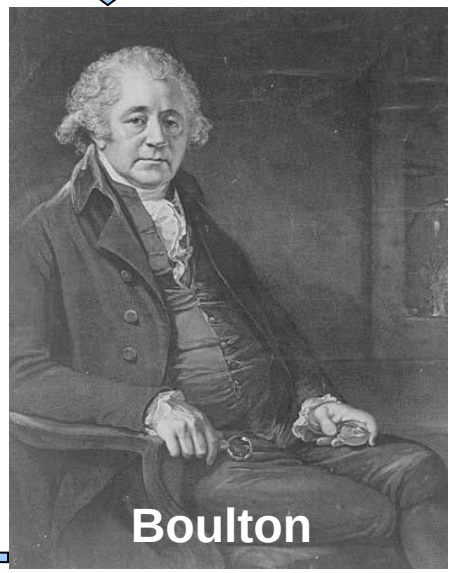

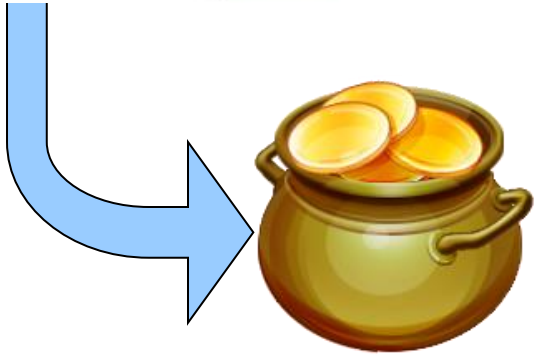

Extended from 14 to 30 Years

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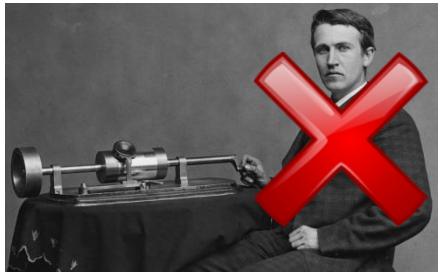
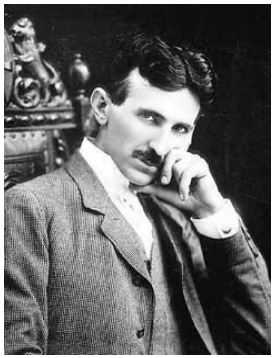
The Electrical Revolution – *AC* vs *DC*

Direct Current



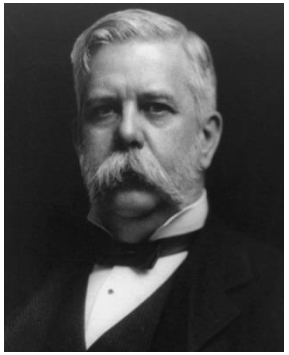
Thomas Edison

Alternating Current



Nikola Tesla

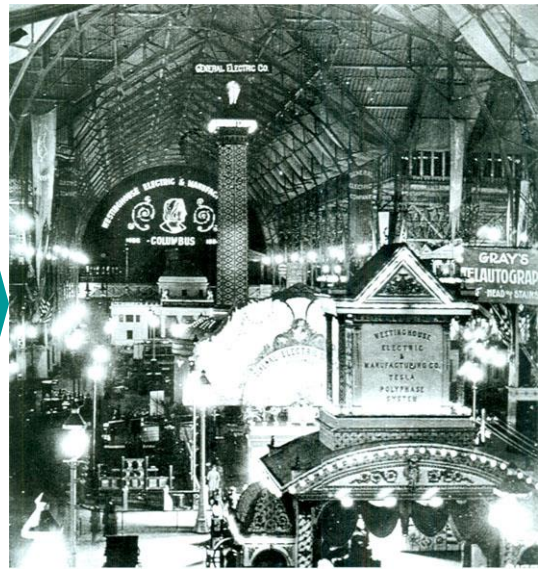
+



George Westinghouse

- *Patents*
- *Open Innovation*
- *Investment*
- *Litigation*

Chicago World's Fair 1893



Westinghouse Tesla Polyphase System (AC)

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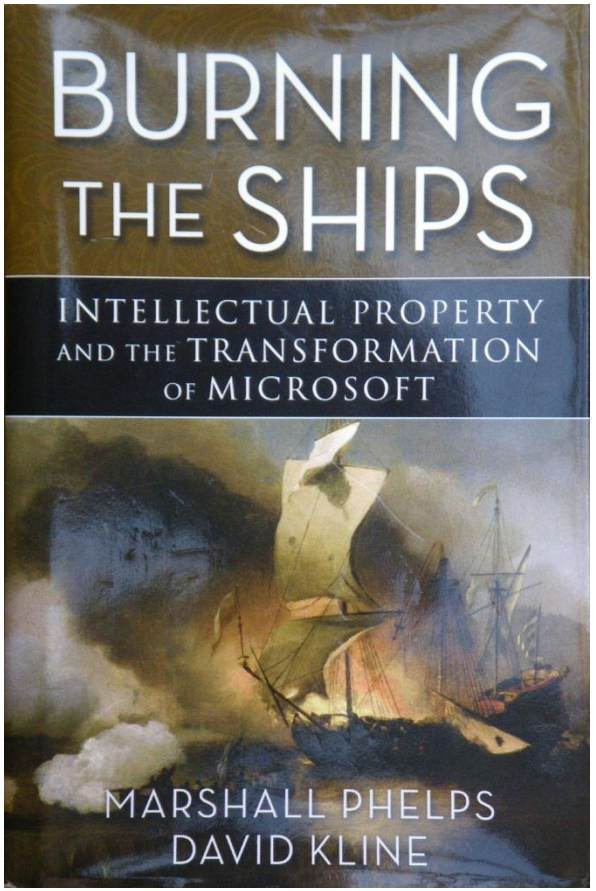
The Software Revolution - Microsoft

- **Bill Gates understood IP**
- **Microsoft built on copyright**
- **Then software patents**
- **IP is the “Bridge to collaboration”:**
  - **Collaborations:**
    - **2003 = 0 (<100 patents)**
    - **2009 = 500 (>20k patents)**
  - **Partnering with Open Source**



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Lessons from 250 years

- **The inventors and heads of these successful companies (Watt, Boulton, Tesla, Westinghouse, Gates) understood IP very well**
- **IP was essential to raising finance for developing their ideas**
- **Most researchers and heads of companies today do <u>not</u> understand IP well – they leave it to their (often non-commercial) IP specialists**
- ***Your invention is more likely to succeed if you are IP-literate***

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Even the Royal Society (1665) understood

 Numb. 1.

PHILOSOPHICAL TRANSACTIONS.

Munday, March 6. 166⅘.

The Contents.

An Introduction to this Tract. An Accompt of the Improvement of Optick Glasses *at* Rome. *Of the Observation made in* England, *of a Spot in one of the Belts of the Planet* Jupiter. *Of the motion of the late* Comet *prædicted. The Heads of many New Observations and Experiments, in order to an Experimental* History of Cold; *together with some* Thermometrical *Discourses and Experiments. A Relation of a very odd Monstrous* Calf. *Of a peculiar* Lead-Ore *in* Germany, *very useful for Essays. Of an* Hungarian Bolus, *of the same effect with the* Bolus Armenus. *Of the New* American *Whale-fishing about the* Bermudas. *A Narative concerning the success of the* Pendulum-watches *at Sea for the* Longitudes; *and the Grant of a* Patent *thereupon. A Catalogue of the Philosophical Books publisht by* Monsieur de Fermat, *Counsellour at* Tholouse, *lately dead.*

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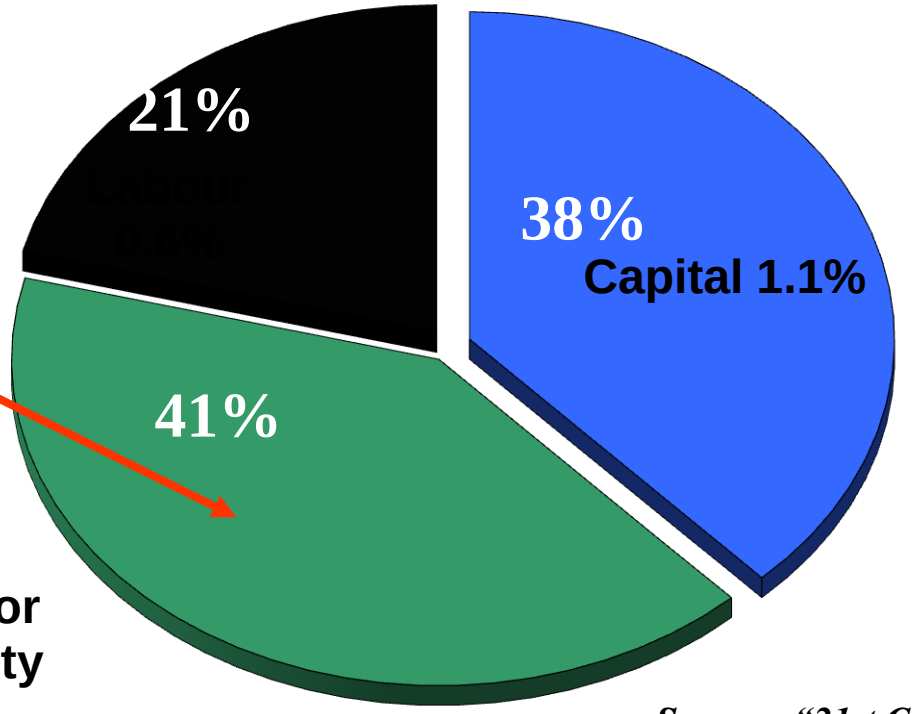
Impact of Technology on GDP Growth
1970-1990 Average 2.9%

Technology is the major driver of world growth



Source : "21st Century Technologies" - OECD 1998

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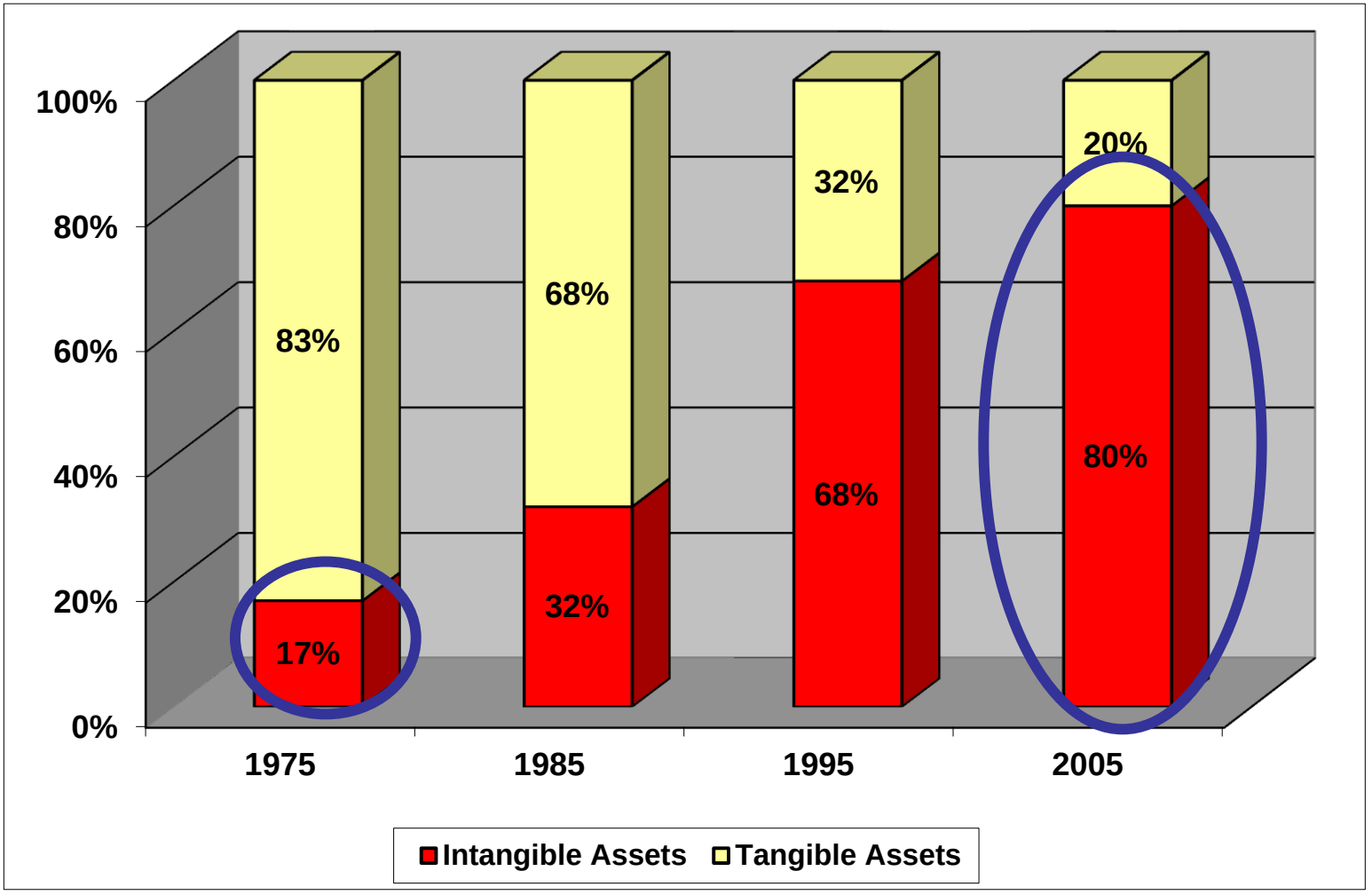
US Corporate Valuations: S&P500®



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IPRs provide:

- **The incentive to innovate and invest in risky new ideas**
- **The legal clarity and certainty for technology transfer transactions – including creation of IP pools – they are enforceable in court**
- **The choice to IPR owners how their IPRs will be used**

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Copyright

- **70/95 years – simple & free – nothing to register**
- **international right, simple, zero cost, certain, use is simple**
- **Make sure you can prove what you wrote and when you wrote it!**
- ***managing ‘creative works’, databases, software ….. research papers!***

© Ian Harvey

Trademarks (Brands) & Origin

- **Last for ever – quite simple and cheap**
- **Need to register in each country for protection**
- **Country specific, relatively simple and certain, cheap**
- ***promise of quality: creating and managing consumer loyalty***

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UCL- based research on DVTs*

Credibility from the UCL trademark

**Deep Vein Thrombosis*

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Ethiopia: Geographic Origin

Coffee varietals:

- ***Sidamo***
- ***Harar***
- ***Yirgacheffe***

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Patents are different ……

- **Patents:**
  - **Last for 20 years**
  - **They are a country-specific right**
  - **They can be exceptionally important (and valuable), but they can be uncertain, complex and expensive to acquire and defend**
  - ***Purpose: encourage investment in innovative but risky ideas, inventions and technology***

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A patent is potentially valuable but an uncertain and expensive right

- **Conditionality: a patent is not an absolute right:**
  - ***Novelty*: at any time new "prior art" from anywhere may invalidate patents everywhere**
  - ***Obviousness*: courts may decide it was "obvious"**
- **Expensive if international:**
  - **$250k lifetime for international patents**
  - **Enforcement: Germany $100k; UK $500k; US $5m & 2 – 7 years; China $20-120K & 2-14 months**
- **You need people with the right skills and resources**

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What does a patent do for you?

- **It gives you the right to ***stop other people*** from making, selling or using your invention commercially**
- **A patent does ***not*** give you the right to use your own invention!**

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Does a patent ……

- ***confer ownership of the technology - the "ownership of life" issue?***
  - **No - patenting is a passive right - - a patent allows you to stop someone else using your invention, it does not confer ownership of the technology or the right to use it**
- ***keep things secret?***
  - **No - a patent puts the invention into the public domain**
- ***last for ever?***
  - **No - a patent ends 20 years after filing the application**
- ***constrain research into the patented area?***
  - **No - patenting does not prevent research except, possibly, in the US**

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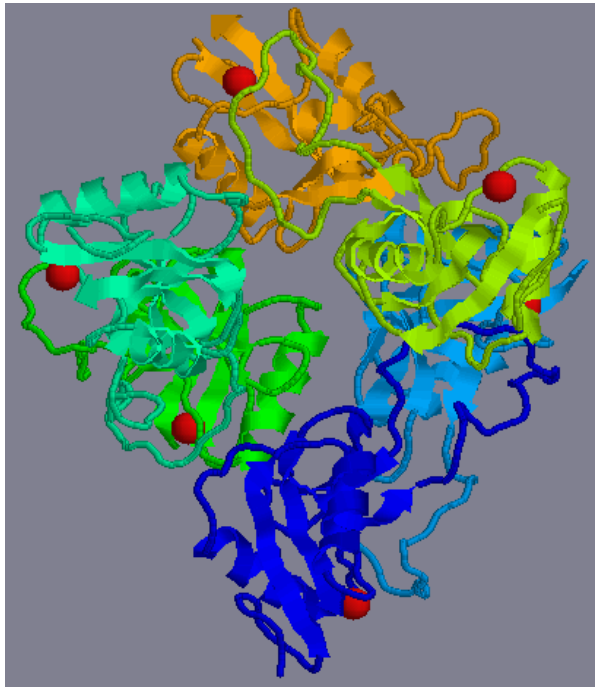
Factor IX *George Brownlee, Oxford*

Treatment for haemophilia B

- **Sequenced the F IX gene**
- **Two independent IP sources - *IP uncertainty – no one developing***
- **Strategy:** ***Brought together IP from Universities of Washington State and Oxford***
- **Result:**
  - **Licensed Genetics Institute (AHP) and five others**
  - **Licencees developed gene therapy applications via different vectors ~$500m invested – *only one succeeded***
  - **Treatment for 13,000 haemophiliacs worldwide**
  - **BTG BeneFIX revenues ~$15 million pa**



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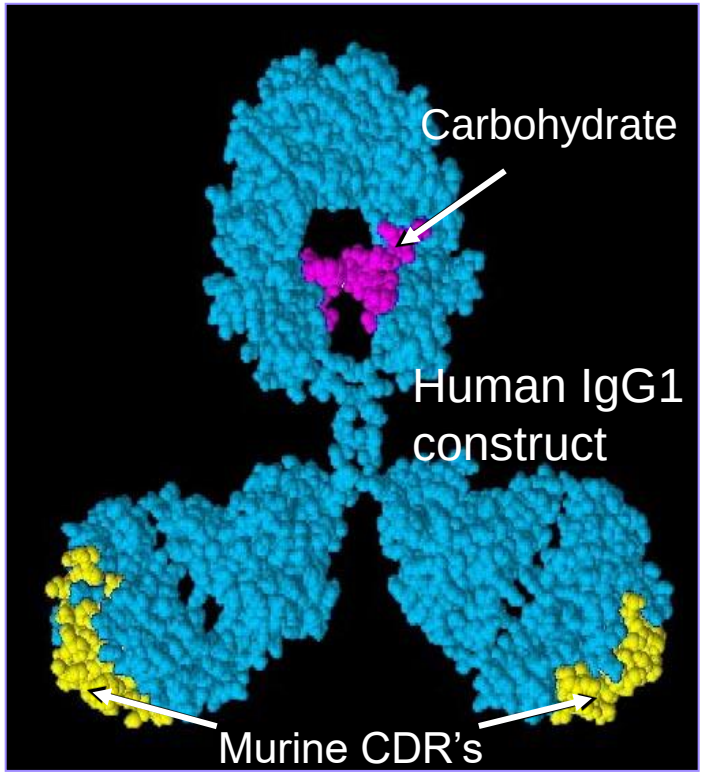
Campath® *Herman Waldman, Cambridge*

- **First monoclonal antibody approved for human therapeutic use**
- **humanised monoclonal antibody directed against the CD52 antigen – 1983**
- **BTG Licensed Wellcome Foundation (now GSK) for rheumatoid arthritis**
- **Failed clinical trials**
- **Development abandoned**
- ***So what happened*?**



Depletes immune cells implicated in variety of auto-immune related disorders

Reverses or halts progression of CLL by depleting the malignant B cells associated with the disease

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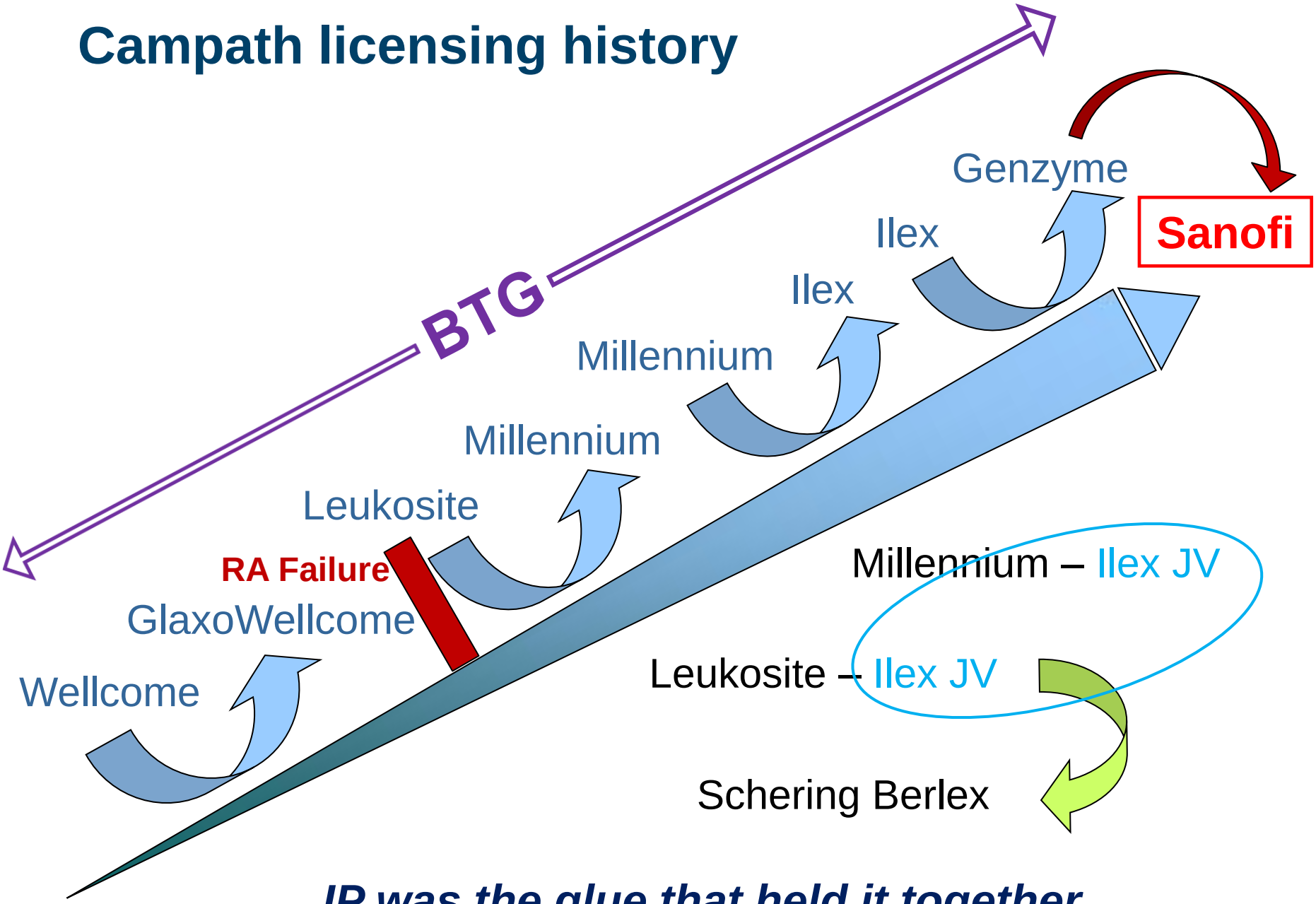
Campath licensing history



IP was the glue that held it together

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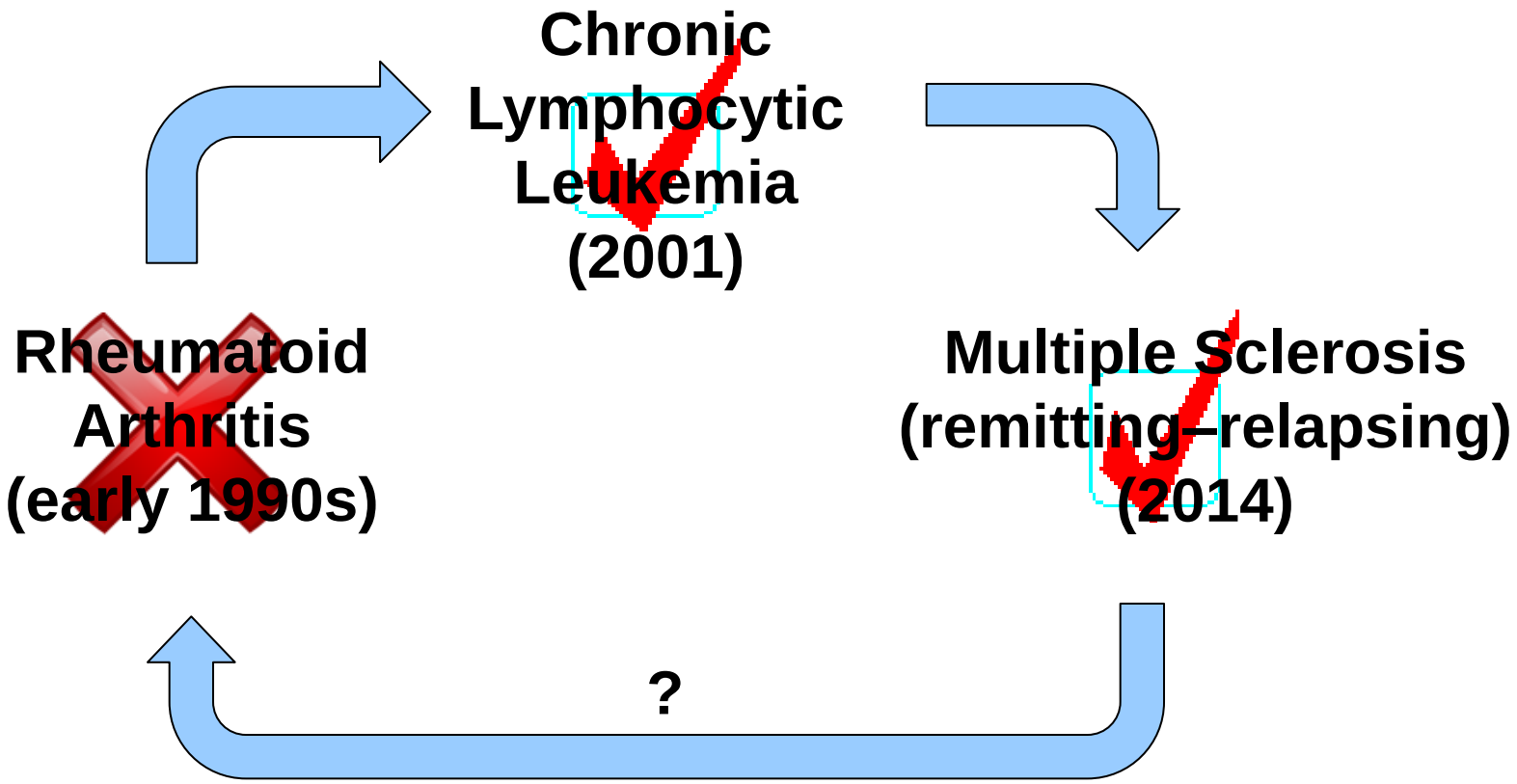
Development comes full circle

Campath 1H → *Alemtuzumab* → *Lemtrada*



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Magnetic Resonance Imaging (MRI)

Peter Mansfield, Nottingham

- **BTG & MRC funded development of technology from 1974-1980 in Nottingham and Aberdeen Universities**
- **BTG created IP portfolio from Nottingham, Aberdeen & Oxford universities**
- ***Existing CAT scanner companies (eg EMI, GE) were not interested***
- **BTG initially licensed 4 new entrants Clinical equipment available by 1983 demonstrated in clinical use by 1985**
- **1986 to 1989: 99% of the world's MRI manufacturers then took licenses: GE, Marconi, Siemens, Toshiba, Hitachi and Shimadzu, Bruker, Fonar, Esaote.**

2003 Nobel Prize for Medicine: Sir Peter Mansfield

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The variety of IP embedded in technical products

Smart Phone

Patents and utility models

- *Data-processing methods*
- *Operating system*
- *Operation of user interface*

Designs

- *Form of overall phone*
- *Arrangement and shape of buttons*
- *Position and shape of screen*

Copyright

- *Software*
- *User manuals*
- *Ringtones*
- *Start-up tone*
- *Images*

Trade marks

- *Brand name*
- *Product type*
- *Start-up tone*

Trade secrets

- *Technical know-how kept "in-house" and not published, e.g. assembly processes, certain materials*

Smart phone *~250,000 patents*

Bluetooth 3.0 *~ 30,000 patents, 200 universities*

Source: Based on EPO academy slides

© Frank Tietze

How to screw up your idea ……

1. **Put it into the public domain "so everyone can use it"**

   Then no one will invest in its development

   BTG: numerous university researchers disclosed what they had done before patenting - destroying any chance of development

2. **Keep sloppy lab books – "*only I will read them*"**

   Then you cannot defend it in court – so no one will invest in it

3. **Be unaware of what others are doing in the field**

So you will miss the collaboration or the company that could make it a success

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What you should do ……

- **Do a patent search yourself:**
  - **EPO: *http://worldwide.espacenet.com/?locale=en_EP***
  - **USPTO: *http://patft.uspto.gov/netahtml/PTO/search-bool.html***
- **Get expert professional advice**
- **Get the advice early:**
  - **Before you publish (in any form – *even a lab poster*)**
  - **Before you contact companies**
- **Create and identify your IP – facilitates collaborations**
- **Be prepared to share the benefits**

© Ian Harvey

A patent gives you the right to use your invention

False

© Ian Harvey

Should a researcher undertake a patent search before starting research?

Yes – one of the best sources of who is doing what research

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“future competition in the world is competition in IP ….”

Wen Jiabao - Chinese Prime Minister
June 2004 et seq

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Tianjin (China) IP Education

- **Every primary and secondary school has an IP teacher**
- **Every child is taught about IP**
- **Why?**
  - ***"Because stealing IP is like stealing your intellect"***
  - ***"Because a modern economy depends on IP"***

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Actress – “Ekstase” - 1933

What did she do that affects all your daily lives?

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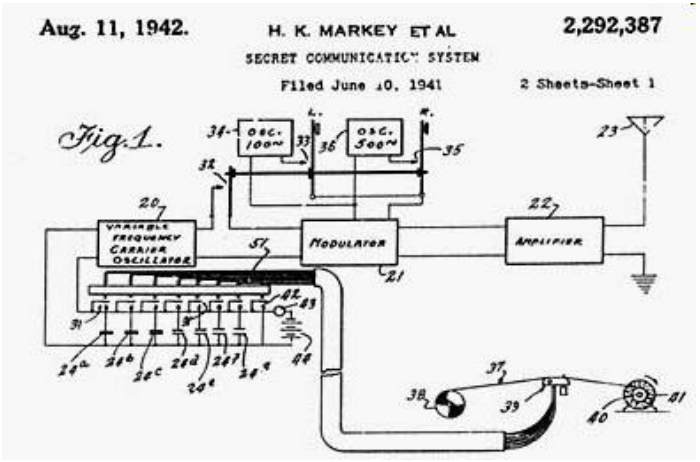
Hedy Lamarr: Inventor

Spread Spectrum Radio Technology



- **Actress – “Ekstase” - 1933**
- **Co-inventor (with Antheil) of Spread Spectrum radio technology**
- **US Patent No: 2,292,387 1942 (Lamarr-Antheil)**
- **Cited by over 1000 subsequent patents including CDMA, TDMA, GPS and 802.11 wireless internet (WiFi)**

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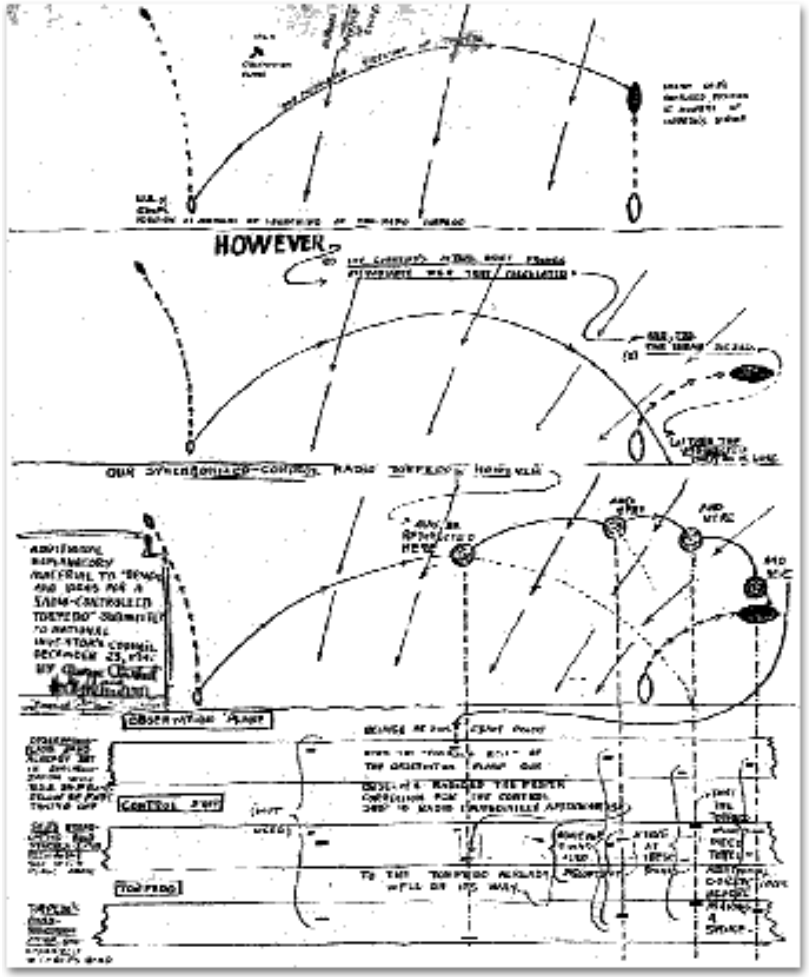
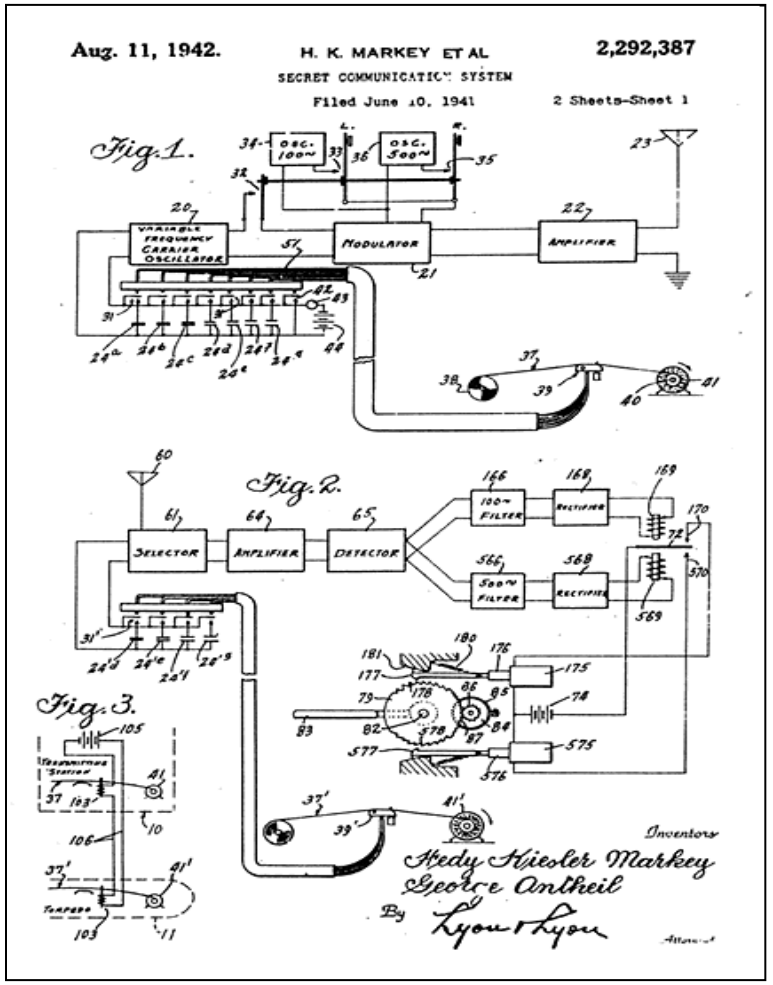
Lamarr-Antheil Spread Spectrum Patent

Disclosure



Patent



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David Payne – the last word on IP

- **Commercialization is important - the country/world does not owe researchers a living**
- **Patents important to commercialization – essential to spinouts/startups**
- **Need the best patent attorneys – often only industry can afford them**
- **File continuously but selectively**
- **Expect a "just" reward***

New products are 1% inspiration, 99% perspiration and investment

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Intellectual Property:
Catalyst ~~or Contaminant?~~

Science, you and the Economy

Ian Harvey

July 10th, 2019

THE ROYAL SOCIETY

Imperial College London BUSINESS SCHOOL

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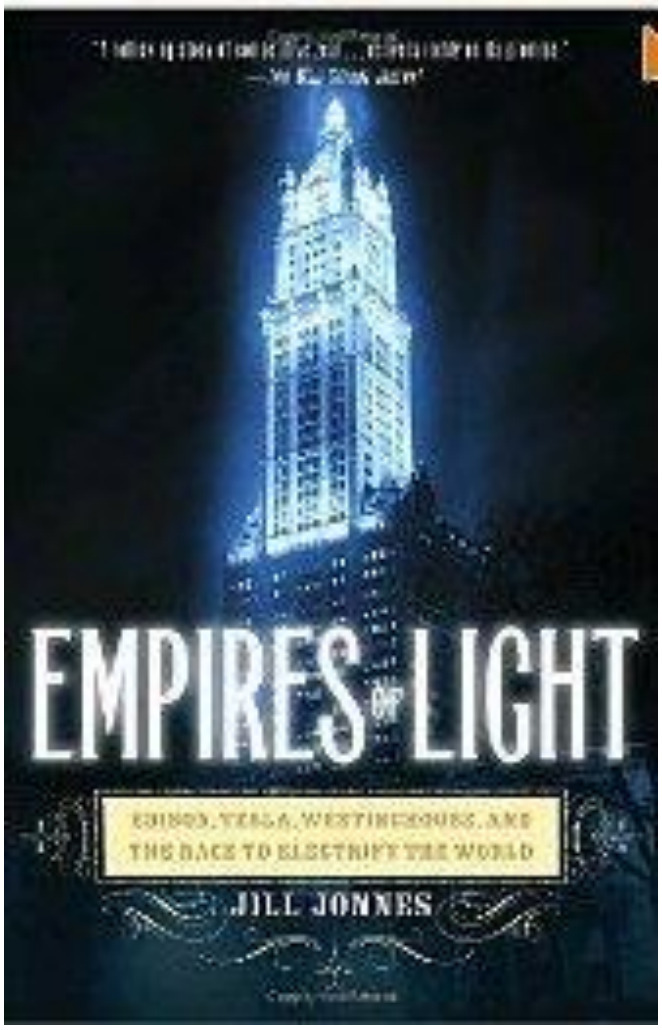
The AC/DC Electrical Revolution



“Empires of Light: Edison, Tesla, Westinghouse and the race to electrify the world” *Jill Jonnes*

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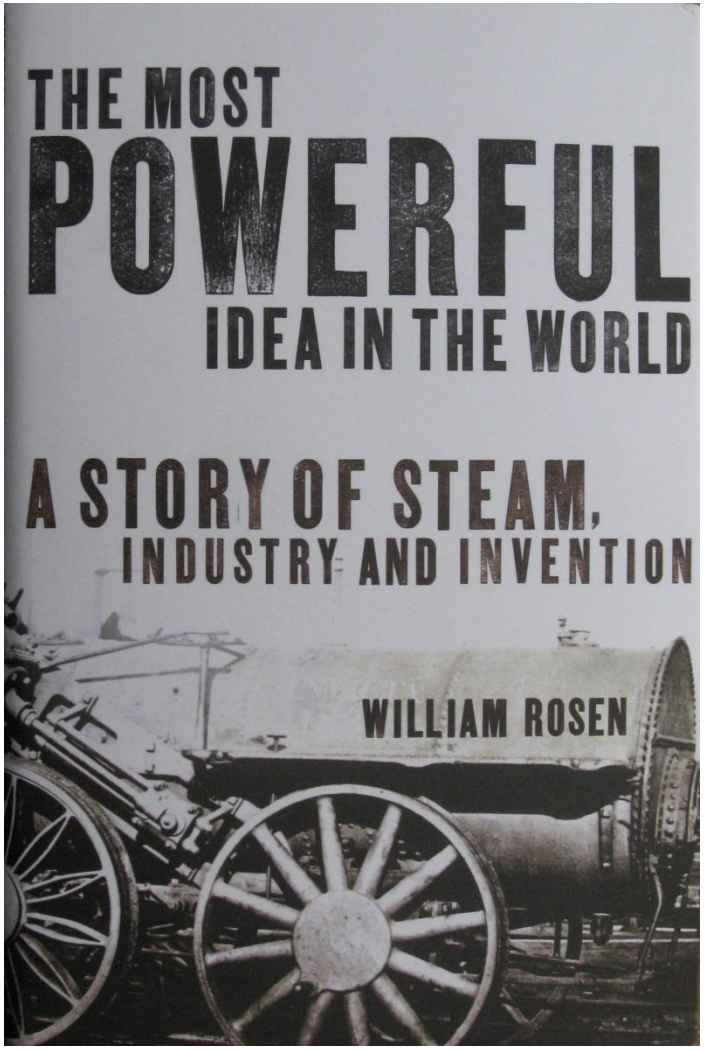
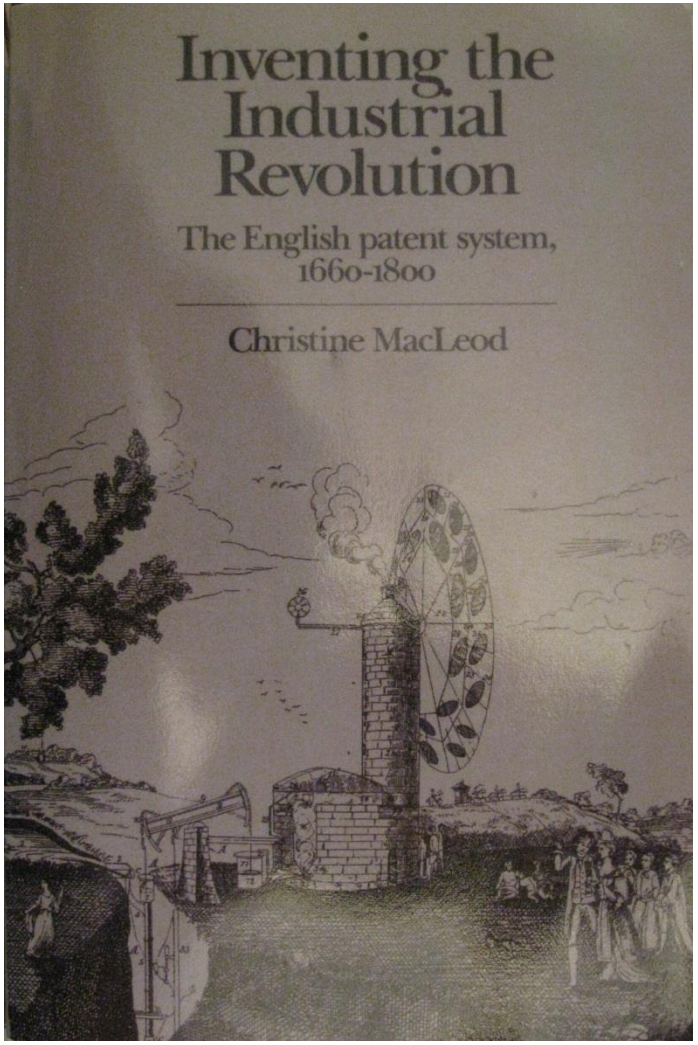
The Industrial Revolution

"Easy reading"



"Academic"



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