Are we asking the right questions?

Great science needs to relate to today's problems…

Susan Appleby, CESG, UK

or does it?

“Basic” research

“Basic research leads to new knowledge. It provides scientific capital. It creates the fund from which the practical applications of knowledge must be drawn … Basic research is the pacemaker of technological progress… A nation that depends on others for its new basic scientific knowledge will be slow in its industrial progress and weak in its competitive position in world trade.”

Science the Endless Frontier by Vannevar Bush; report to President Truman, 1945

“Applied” research

“University professors who are opposed to organising, planning and directing research after the manner of industrial laboratories … have something to think about now. A most important piece of research [the atomic bomb] was conducted on behalf of the Army in precisely the means adopted in industrial laboratories. End results: an invention was given to the world in three years, which would have taken perhaps half-a-century to develop if we had to rely on prima donna research scientists who work alone”

New York Times, 7th August 1945

An old debate

a new topic

Science of Security

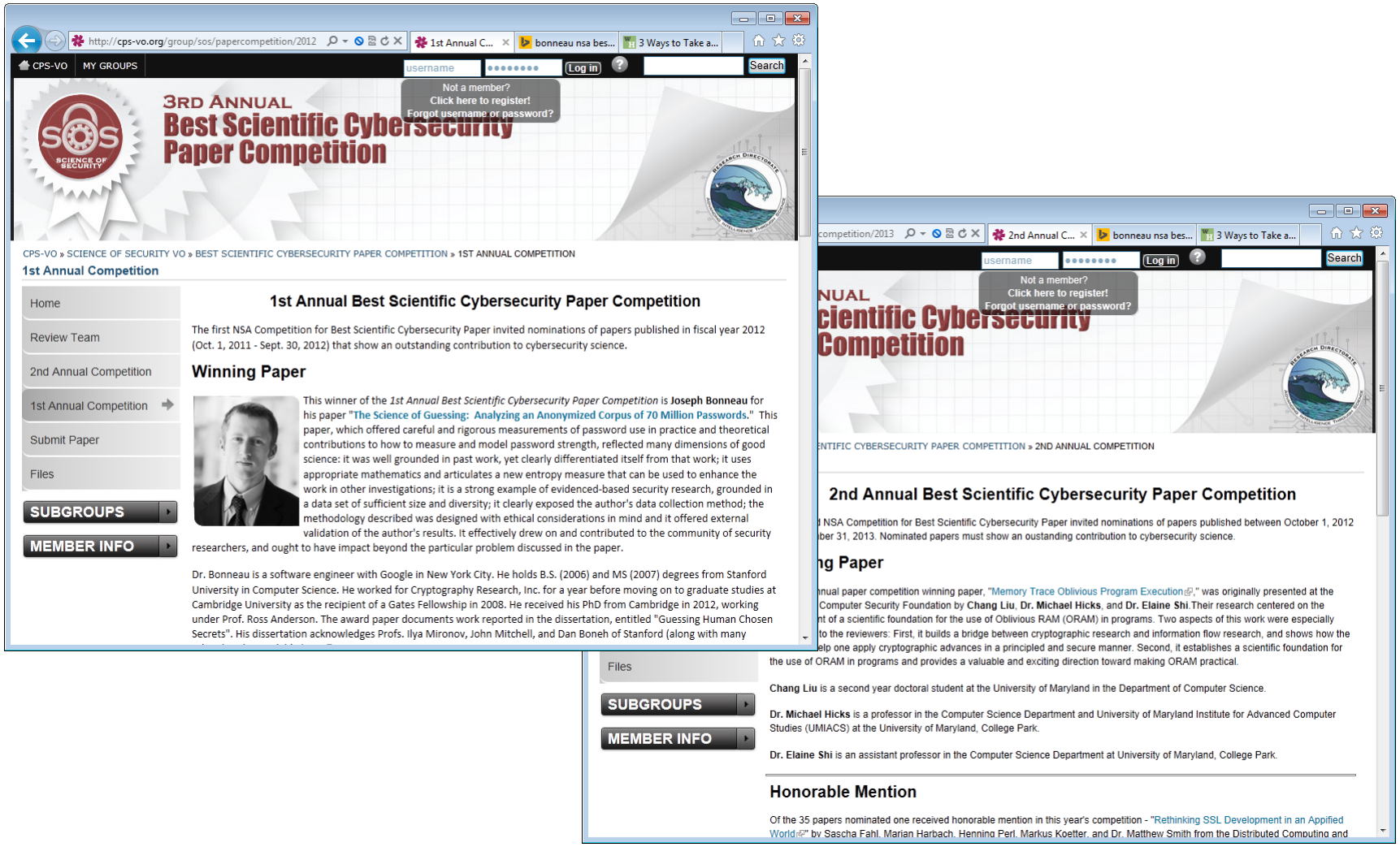
Basic
Blue skies
Fundamental
"More inspired and creative"

Problem driven
Useful
Shorter term?
Narrower scope?

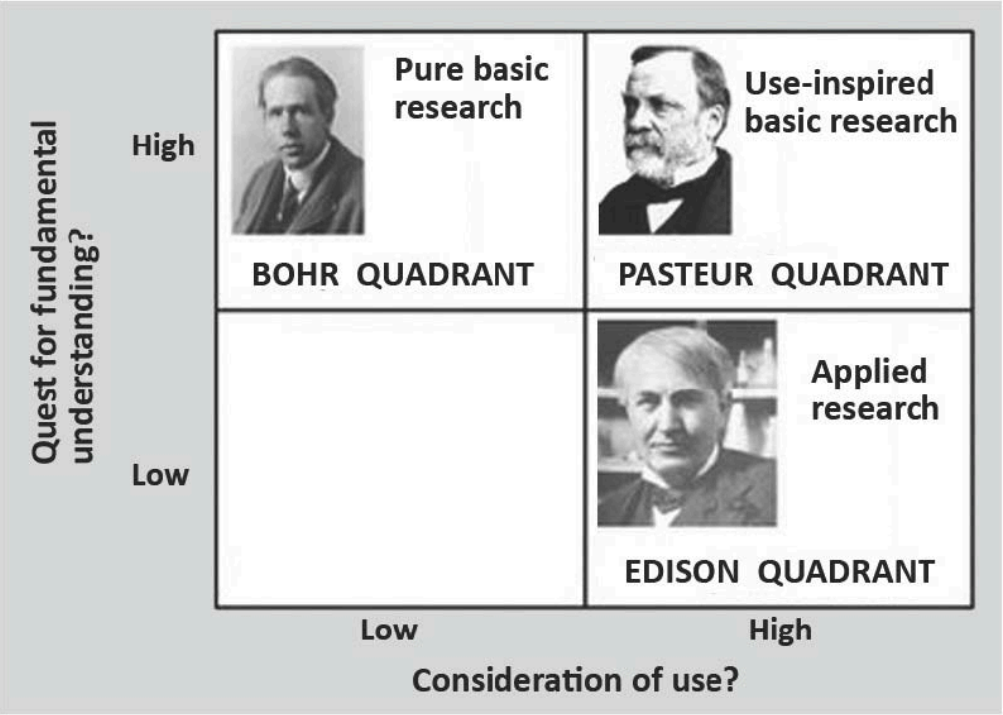
Basic vs applied research:
what should the balance be?

"Can we *afford* blue skies research in cybersecurity? In a field where the landscape alters beyond recognition every 3-5 years?"

Hm… papers are hard to categorise

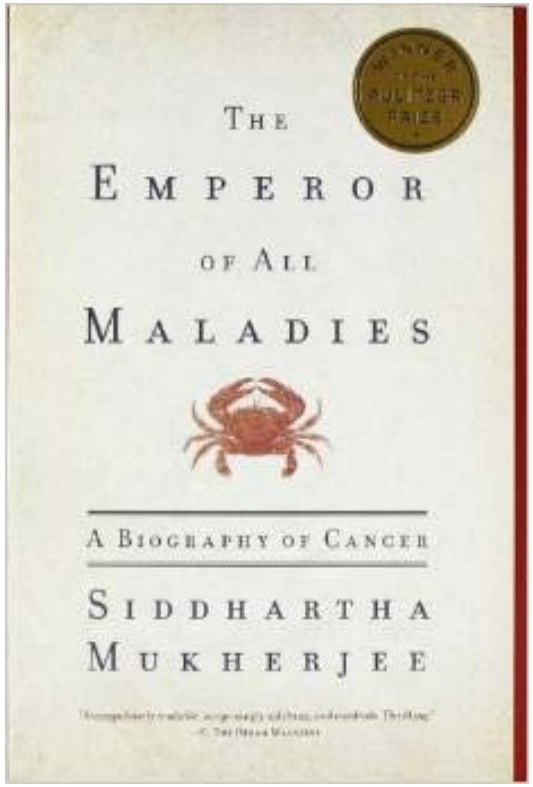


Stokes proposed an alternative (1997)



Research can simultaneously be driven by considerations of use and by a quest for fundamental understanding

Remember those 1945 quotes? I stole them from this book



About the Author
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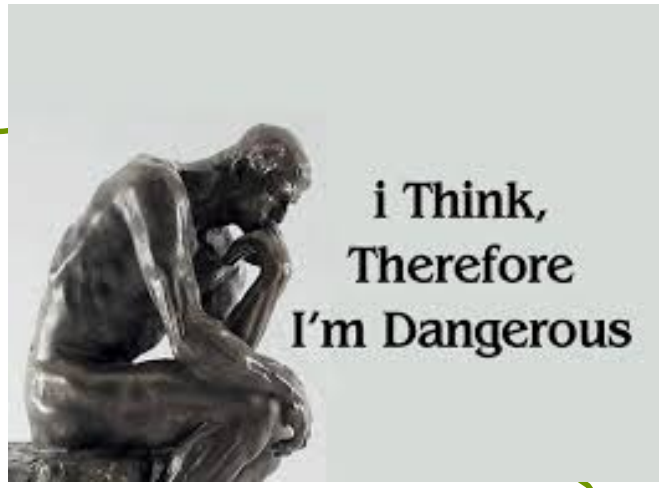
a CV flitting between research and practice

UCL HOSPITALS

Sidra Medical and Research Center, Qatar

in a field where research and practice are intertwined

Whereas, back in cybersecurity…



..The Great Divide?

Research

Practice

Vox Pop

"Apparently it's quite common for research proposals to get a kicking from reviewers because they don't show any appreciation of the realities of life in the healthcare sector. I don't think this is true of cyber ones."

RCUK worker – personal correspondance

"We've just done a big piece of work on anonymising a massive scale public record database – so it can't be de-anonymised. We looked at what was out there – academic stuff – well, let's just say we decided not to use it."

Commercial IT research worker

"We don't really bother looking at academia. We did take a look once, but there wasn't anything relevant there. We didn't bother again."

Government security researcher

Is this why there are gaps in our capability?

Research Area	Number of UK Academic Centres of Excellence covering area (2013 data)
Cryptography, key management & related protocols	2
Information Risk Management	0
Systems Engineering & security analysis	6
Information Assurance Methodologies	1
Operational Assurance Techniques	0
Strategic technologies and Products	2
Science of Cyber Security	1
Building Trusted and Trustworthy Systems	3

Data from ACE-CSR assessment exercise 2013

Some examples from my perspective

- System security architecting
  - Extremely skilled work
  - But many repeatable/mechanistic elements
  - Design principles not defined
  - … But researchers lack insight into this world/access to practitioners
- Human context switching
  - Audio/visual interfaces across different trust domains
  - How does security behaviour change with rapid context switching?
  - How does design affect mistakes? decisions?
    - Eg – Multi domain telephony/VTC
    - Eg – browse down solutions
    - Eg – BYOD

Barriers to collaboration

- Commercial (IPR protection, pressure to deliver, 'firefighting' climate)
- Cultural (language, skillsets, mismatched incentives)
- Ethical (data privacy)
- Logistical (red tape, inflexible funding mechanisms, national security)
- Difficulty of working across disciplines

Some UK initiatives to help

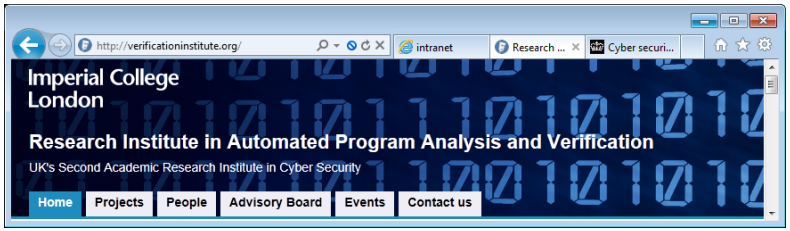
- Academic Centres of Excellence in Cyber Security Research
  - Recognising centres with breadth and depth of expertise
  - 11 UK Universities now recognised as ACE-CSRs
  - Community build

EPSRC Pioneering research and skills

GCHQ

BIS Department for Business Innovation & Skills

- Research Institutes
  - Funded research, building strategic capability
  - RI – *Science of Cyber Security*
  - RI – *Automated Program Analysis & Verification*
  - RI – *Trustworthy Industrial Control Systems*
  - Platforms for dialogue & collaboration



EPSRC Pioneering research and skills

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BIS Department for Business Innovation & Skills

An attempt at a conclusion

- I assert:
  - We need more “use-inspired research”
  - We need greater entwinement between practitioners and researchers
    - Researchers need more exposure to problem owners
    - Problem owners need to divert more resource away from firefighting into research
- I ask:
    - Is co-location (part of) the answer??
    - How do we break down the barriers to collaboration?

DISCUSS!!...