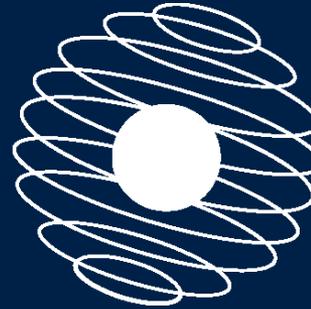


CYBER  
SECURITY  
CENTRE



# Cyber Security in the University of Oxford: **Collaborating without Conforming?**

Andrew Martin  
June 2013

Workshop on Addressing R&D Challenges in  
Cybersecurity: Innovation and Collaboration Strategy

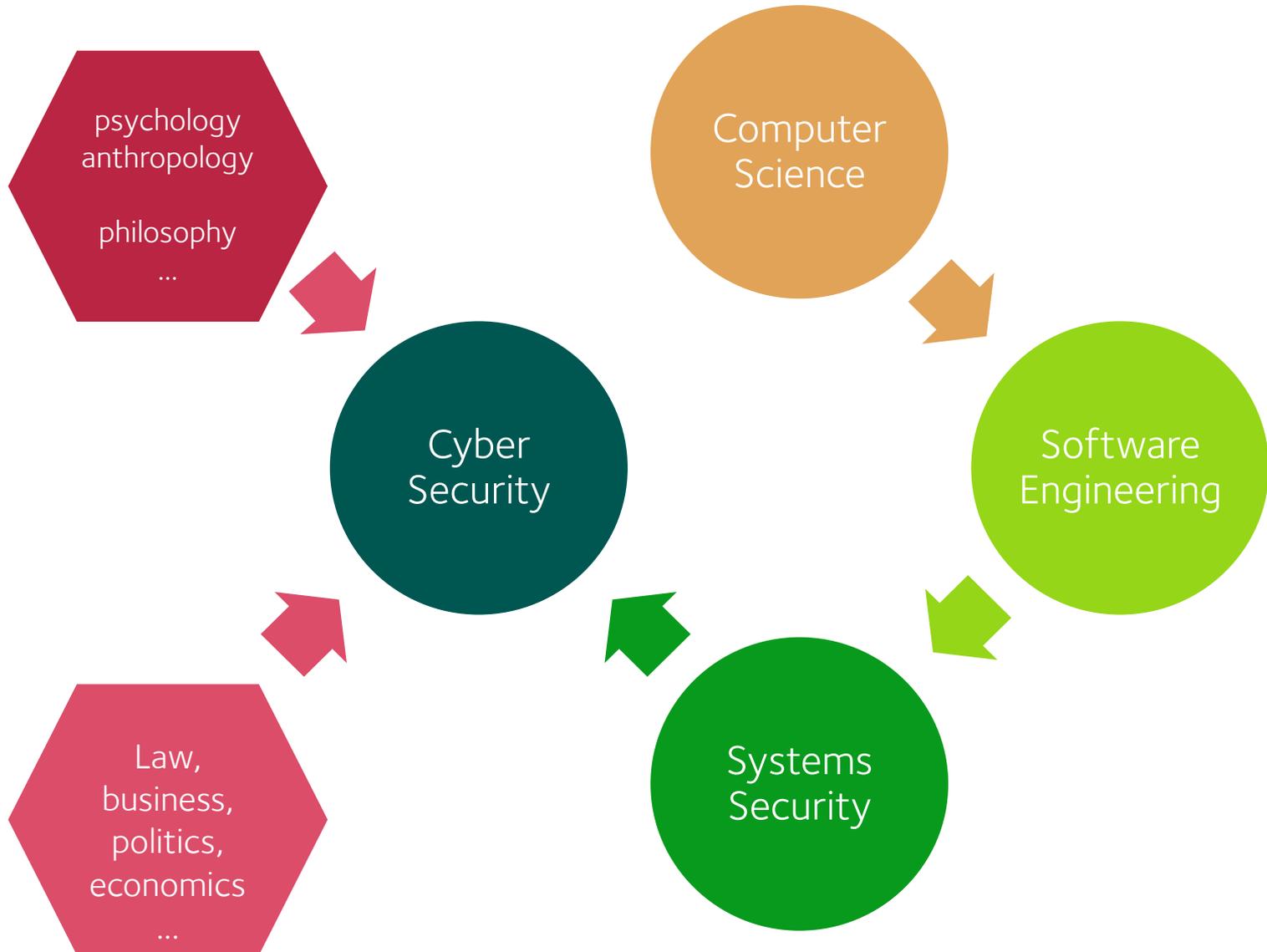
Cybersecurity is the collection of **tools, policies, security concepts, security safeguards, guidelines, risk management approaches, actions, training, best practices, assurance** and technologies that can be used to protect the cyber environment and organization and user's assets.

**Organization and user's assets** include connected computing devices, **personnel, infrastructure, applications, services, telecommunications systems**, and the **totality of transmitted and/or stored information** in the cyber environment.

Cybersecurity strives to ensure the **attainment and maintenance of the security properties** of the organization and user's assets against **relevant security risks** in the cyber environment.



# A personal journey



# Cyber Security Activity in the University

Research

- information theory
- cryptography
- CS theory
- systems
- usability
- human factors
- privacy
- law, regulation
- process and risk management
- economics
- corporate governance
- international policy
- intelligence
- national security

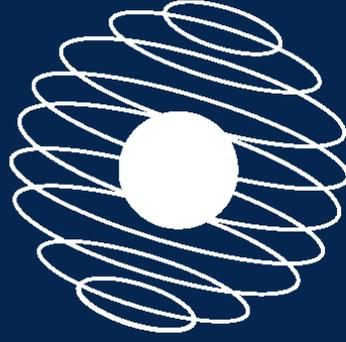
Education

- MSc in Software and Systems Security
- CS Security Modules
- executive education
- doctoral programmes
- elements in Masters programmes in OII, Blavatnik, ...

University itself

- Good practice awareness and general education
- experimental test community
- information security Policy

# CYBER SECURITY CENTRE



Oxford Intern  
Said Business  
Oxford Marti  
Oxford e-Res  
IT Services  
Computer Sc  
Blavatnik Sch

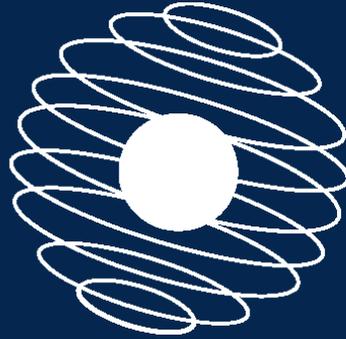


Research

Education

University itself

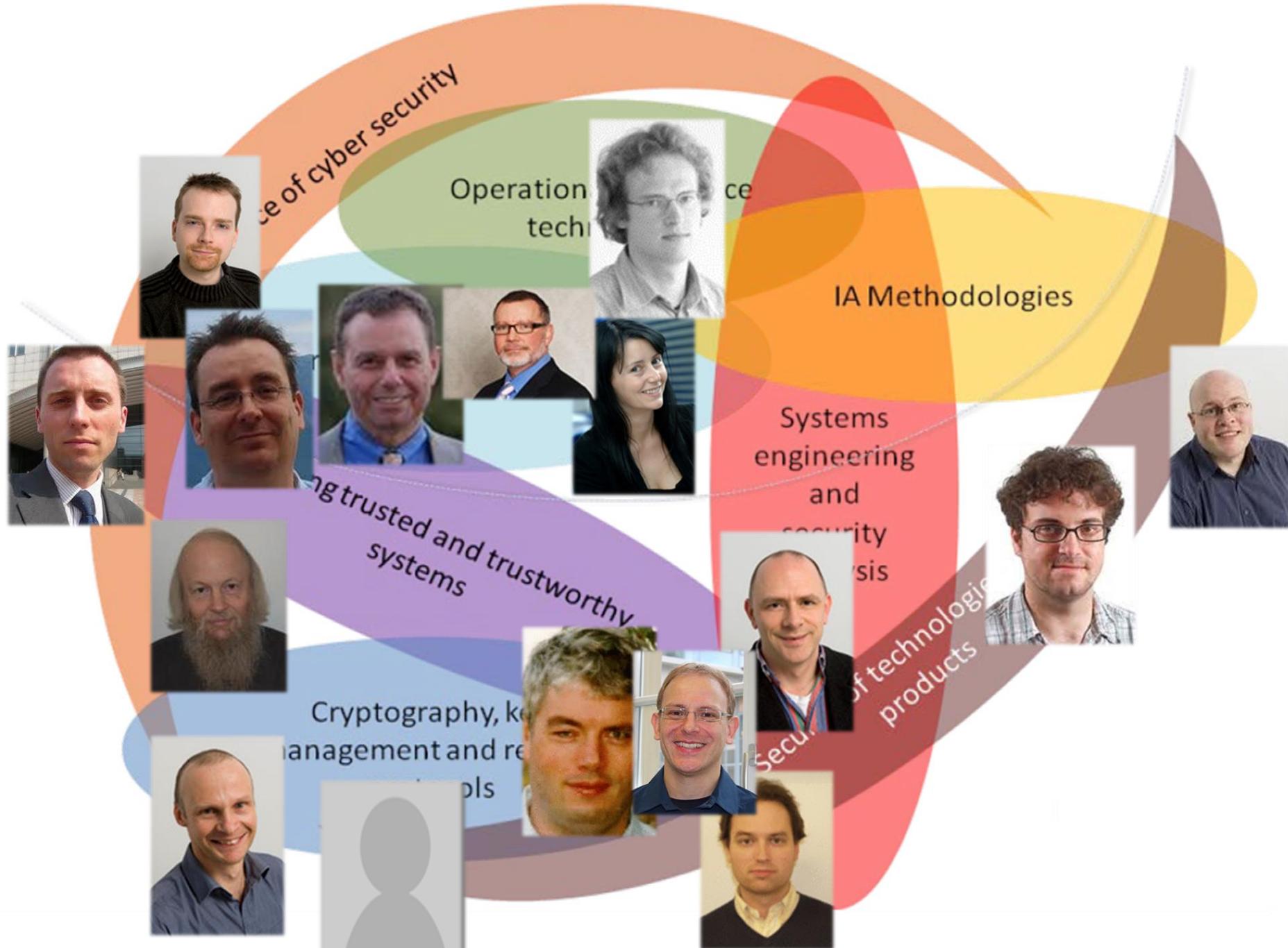
# CYBER SECURITY CENTRE



The foundations of non-standard authentication  
Corporate Insider Threat Detection:  
Cyber Security Inside and Out  
Evaluating Usability, Security, and  
Trustworthiness of Ad-hoc Collaborative  
Environments  
Federated Secure Sensor Network  
Laboratory  
Self-organizing Adaptive Technology  
underlying Resilient Networks  
Trustworthy Digital Systems  
Trustworthy Clouds - Privacy and  
Resilience for Internet-scale Critical  
Infrastructure  
Trust Enabling Augmented-Reality  
Support For Information-Environments

Physical attack containment  
CyberVis  
Ensuring Consent and Revocation  
Framework for Responsible Research &  
Innovation in ICT  
Future Home Networks and Services  
Unleashing the power of information for  
a sustainable future  
High Performance Computing  
Technologies for Smart Distribution  
Network Operation  
Identity security – aggregation threat  
Integrated Mobile Security Kit  
Information Security  
University Information Security Policies  
Information Security Project  
Insider threat detection

Research



# Academic Centres of Excellence in Cyber Security Research

GCHQ-EP SRC sponsored programme; modelled on a large, established scheme in the USA.

Review process: assessment based on research portfolio, doctoral programme, staff profile, vision and plans

Eight centres recognised in 2012; three more in 2013

Oxford, Bristol, Royal Holloway, Imperial, UCL, Southampton, QUB, Lancaster, Cambridge, Birmingham, Newcastle



Academic Centre of Excellence in  
Cyber Security Research





- Our aim is to understand **how to deliver effective cyber security** both within the UK and internationally. We will make this knowledge available to governments, communities and organisations to **underpin the increase of their capacity** in ways appropriate to ensuring a cyber space which can continue to grow and innovate in support of well-being, human rights and prosperity for all.



# Global Centre for Cyber Security Capacity-Building

- collect case studies, examples of best practice
- develop metrics and models of cyber security capacity maturity
- disseminate and use metrics to drive improved practice



# Global Centre for Cyber Security Capacity-Building



Sadie Creese  
Dept. of Computer Science



Ian Brown  
Oxford Internet Institute



Marco Gercke  
Cybercrime Research Inst.



Paul Cornish  
Exeter University



Bill Dutton  
Oxford Internet Institute



Ivan Toft  
Blavatnik School of Govt.



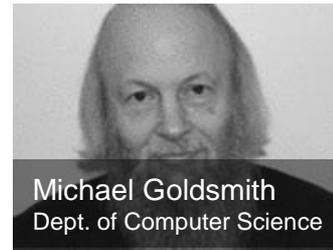
Angela Sasse  
UCL



David Upton  
Saïd Business School



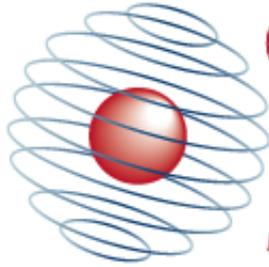
Andrew Martin  
Dept. of Computer Science



Michael Goldsmith  
Dept. of Computer Science



Fred Piper  
Royal Holloway U. London



## new model of PhD/DPhil

- promoted and funded by research councils
- £3.6m grant; 12 funded places per year; 3 annual intakes

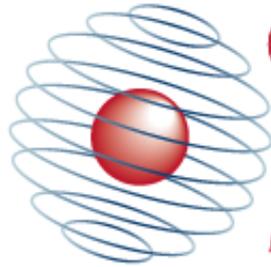
## year one:

- intensive education in cyber security
- two mini-projects (internships encouraged)
- seminars, industry 'deep dives', field trips

## years two–four:

- research in an Oxford academic department
- skills training throughout
- retain contacts with internship companies





# CENTRE FOR DOCTORAL TRAINING *in* CYBER SECURITY

cyber security  
principles:  
systems

cyber security  
principles: risk  
and operations

usable security

security  
architectures and  
information  
defence

high-integrity  
systems  
engineering

cross-disciplinary  
Research  
Methods

forensic  
techniques and  
criminology

security of  
distributed  
Systems

systems  
modelling tools

cyber security  
analytics and  
decision support

malware

*skills*

business process  
and context

security policy  
and governance  
of cyberspace

international  
relations and  
cultural norms

ethics

# Collaborating

- GCHQ support – and other parts of government
- EPSRC Global Uncertainties Programme
  - *regular research grants*
  - *Academic Centres of Excellence*
  - *Research Institutes*
  - *CDTs*
- Industrial Support and Collaboration
  - *direct funding*
  - *TSB projects*
  - *CASE studentships*
  - *EU FP7 / Horizon 2020*

- collaborating across disciplines brings some (now) well-known challenges
- superb opportunities – but their nurture takes time and resources
- even collaborating *within* disciplines can be novel
- cyber =?= reality
- issues of nomenclature ... bounding ... scope

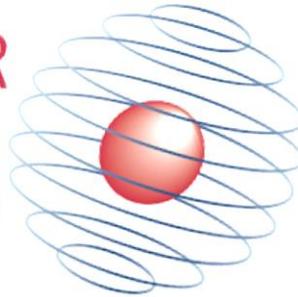
# Collaborating ... not conforming

- intelligence agencies make for strange bedfellows
  - staying at arm's-length can be very desirable
- ... similar concerns for other parts of government
  - budgets and timescales (and topics) not always appropriate
- ... and companies?!
- classic dichotomies of
  - short/long-term research;
  - theory/practice;
  - scientific curiosity/economic imperative
- *particularly notable in the cyber security domain*
  - pressing, urgent problems abound
  - tendency to treat the symptoms not the cause
- balance isn't at all bad, actually!
  - but needs on-going attention

# Conclusion

- Universities exceedingly well-placed to contribute
  - unique mix of skills for collaboration
- Government funding welcome
  - “*drinking from a fire-hose*”
  - anticipated drought someday
- Who sets the agenda?!
- All sides still learning on this

**CENTRE FOR  
DOCTORAL TRAINING**  
*in CYBER SECURITY*



UNIVERSITY OF  
**OXFORD**

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