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# Student researchers and publication ethics – TL;DR LOL ;)

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- Research integrity and publication ethics
- UoM's approach to research integrity
- UoM's approach with student researchers
- Our observations on interactions with student researchers and their interactions with research integrity and publication ethics



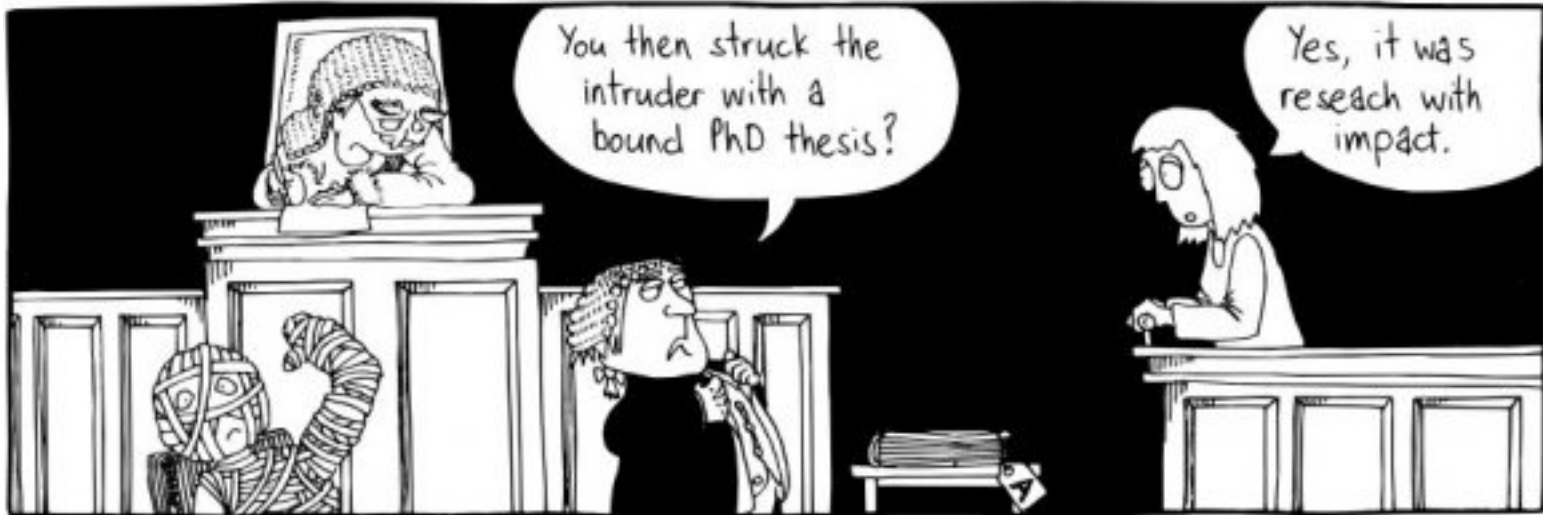
- TL;DR
  - Short for ‘too long; didn’t read’
- Perception that students need information presented in short, snappy bites and that short attention spans means that details are not properly considered
- Not the case in our experience
- Isn’t short snappy bites good for everyone anyway...?



- “the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions’ -OED online
- it is iterative and accretionary
- it builds on itself – one step at a time – it is rarely revolutionary
- it is a deeply human endeavour



- ...are broad and unpredictable
- no guarantee what the impact will be or when it will impact



- *Virology*
- Impact factor = 3.249
- Jian Zhou *et al.*
- *Expression of Vaccinia Recombinant HPV 16 L1 and L2 ORF Proteins in Epithelial Cell is Sufficient for Assembly of HPV Virion-like Particles*

studies and could provide a safe source of material for the development of a vaccine. © 1991 Academic Press, Inc.

## INTRODUCTION

Infection of the human cervix with human papillomavirus (HPV) types 16 or 18 is strongly associated with cervical cancer (Durst *et al.*, 1983; Fuchs *et al.*, 1988). Unlike other HPV genotypes (Kreider *et al.*, 1987), HPV16 and 18 have not been propagated *in vitro* and intact virions have not been seen in naturally infected tissues. HPV16 late gene proteins L1 and L2 have been produced by recombinant DNA technology in prokaryotic (Doorbar and Gallimore, 1987; Banks *et al.*, 1987; Strike *et al.*, 1989) or eukaryotic (Browne *et al.*, 1988; Zhou *et al.*, 1990) expression systems and are believed to be the capsid proteins. However, the components of the HPV16 virion and the mechanism of virus particle assembly in the nucleus of the HPV-infected cell are essentially unknown, although the E4 protein has been thought to play a role in virion assembly (Doorbar *et al.*, 1986). We therefore examined the production of HPV-like particles in cells infected with recombinant vaccinia viruses simultaneously expressing combinations of the HPV16 E4, L1, and L2 genes. Production of virus-like particles by recombinant vaccinia viruses was demonstrated by electron microscopy (EM), and the involvement of HPV protein confirmed by immunoblotting.

## MATERIAL AND METHODS

### Recombinant vaccinia viruses

The HPV16 L1 gene, from the second ATG (nt 5637), was amplified by polymerase chain reaction from pHPV16 (provided by Dr. Gisselmann), using the primers

<sup>1</sup> To whom requests for reprints should be addressed.

1/ 5'-CAGATCTATGTCCTCTTTGGCTGCCTAGTGAGGCC-3'  
2/ 5'-CAGATCTAATCAGCTTACGTTTTTTGCGTTTAGC-3'

The first methionine codon and stop codon are indicated by underline, and *Bgl*II sites were included to facilitate subcloning. The amplified 1527-bp fragment was extracted with phenol and purified by 1% agarose gel electrophoresis. After digestion with *Bgl*II, the L1 gene was subcloned into the *Bam*HI site of the RK19 plasmid (Kent, 1988) which contains a strong vaccinia virus promoter (4b). The resulting plasmid was sequenced (Sanger *et al.*, 1977) and used to prepare a fragment containing the HPV16 L1 gene linked to the 4b promoter by digestion with *Mlu*I and *Sst*I. This fragment was bluntended with T4 DNA polymerase and cloned into the vaccinia intermediate vector pLC1, which contains the B24R gene of vaccinia virus (Kotwal and Moss, 1989; Smith *et al.*, 1989), an *E. coli gpt* gene (Falkner and Moss, 1986; Boyle and Coupar, 1988), and multiple cloning sites (Zhou *et al.*, 1991b), to produce plasmid pLC200.

The HPV16 L2 gene was prepared by partial digestion of pHPV16 with *Acl*I to produce a fragment (4138-5668 nt) which was filled with Klenow and linked to synthetic *Bam*HI linkers. This L2 fragment was cloned into a pUC-derived plasmid termed p480 which has a synthetic vaccinia 28K late promoter, with some modifications (Davison and Moss, 1989). The promoter sequence is

5'-GAGCTCTTTTTTTTTTTTTTTTTTTTGG-

CATATAAATGGAGGTACCC-3'

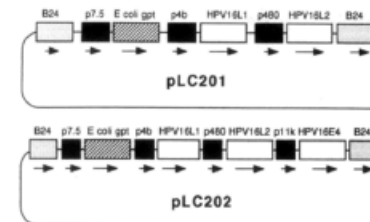
with the late promoter motif underlined. A fragment containing the L2 gene linked to the 28K promoter was

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equal fractions of 0.25 ml were collected. Samples were mixed with 0.6 ml ethanol. The pellet obtained after centrifugation at 4° and 12000 g for 20 min was collected for further analysis. To determine the density of the virus-like particles, equilibrium density-gradient sedimentation was performed in CsCl (1.30 g/ml). After centrifugation at 125,000 g for 20 hr, 11 fractions of 0.25 ml were collected. The density of each fraction was determined, and each was examined for virus-like particles by transmission electron microscopy.

Electron microscopy



- *Virology*
- Impact factor = 3.249

- Jian Zhou *et al.*
- *Expression of Vaccinia*

*Recombinant HPV 16 L1 and L2  
ORF Proteins in Epithelial Cell is  
Sufficient for Assembly of HPV  
Virion-like Particles*

studies and could provide a safe source of material for the development of a vaccine. © 1991 Academic Press, Inc.

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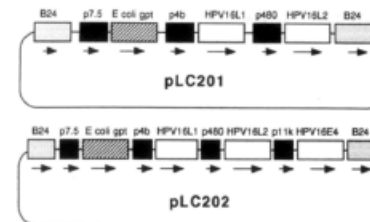
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Types 6, 11, 16, 18



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Electron microscopy



# Research Impact 2 – Where did WiFi come from?

- U.S. Patent 5,487,069



US005487069A

**United States Patent** [19] [11] **Patent Number:** **5,487,069**  
**O'Sullivan et al.** [45] **Date of Patent:** **Jan. 23, 1996**

[54] **WIRELESS LAN** 26–line 35.  
 IEEE Transactions on Communications, vol. 39, No. 5, May 1991, New York US pp. 783–793 E. F. Casas et al. 'OFDM for Data Communication over Mobile Radio FM Channels—Part I: Analysis and Experimental Results' p. 784, left col., line 1—right col., line 2; FIG. 1 p. 790, right col., line 18—line 22.

[75] Inventors: **John D. O'Sullivan**, Ermington; **Graham R. Daniels**, Willoughby; **Terence M. P. Percival**, Lanc Cove; **Diethelm L. Ostry**, Petersham; **John F. Deane**, Eastwood, all of Australia

[73] Assignee: **Commonwealth Scientific and Industrial Research Organisation**, Australia

[42] Appl. No.: **157,375**

[22] Filed: **Nov. 23, 1993**

[30] **Foreign Application Priority Data**  
 Nov. 27, 1992 [AU] Australia ..... PL6069

[51] **Int. Cl.<sup>6</sup>** ..... **H04B 7/01**

[52] **U.S. Cl.** ..... **370/94.3; 375/284; 375/348; 455/52.3; 455/65**

[58] **Field of Search** ..... **375/34, 39, 51, 375/57, 58, 99, 101, 254, 261, 279, 284, 285, 346, 348; 370/95.3; 455/56.1, 54.1, 63, 65, 52.3**

[21] Appl. No.: 157,375

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[58] Field of Search ..... 375/34, 39, 51, 375/57, 58, 99, 101, 254, 261, 279, 284, 285, 346, 348; 370/95.3; 455/56.1, 54.1, 63, 65, 52.3

[57] **ABSTRACT**  
 The present invention discloses a wireless LAN, a peer-to-peer wireless LAN, a wireless transceiver and a method of transmitting data, all of which are capable of operating at frequencies in excess of 10 GHz and in multipath transmission environments. This is achieved by a combination of techniques which enable adequate performance in the presence of multipath transmission paths where the reciprocal of the information bit rate of the transmission is short relative to the time delay differences between significant ones of the multipath transmission paths. In the LANs the mobile transceivers are each connected to, and powered by, a corresponding portable electronic device with computational ability.

[56] **References Cited**

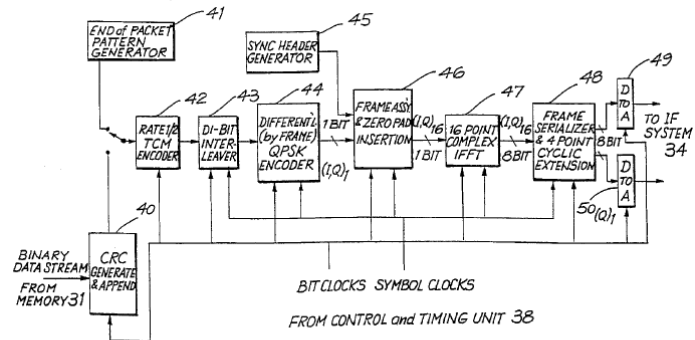
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72 Claims, 8 Drawing Sheets



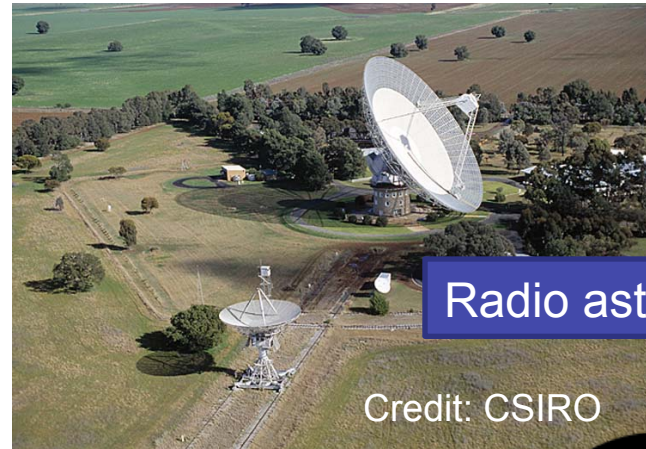




## Research Impact 2 – Where did WiFi come from?

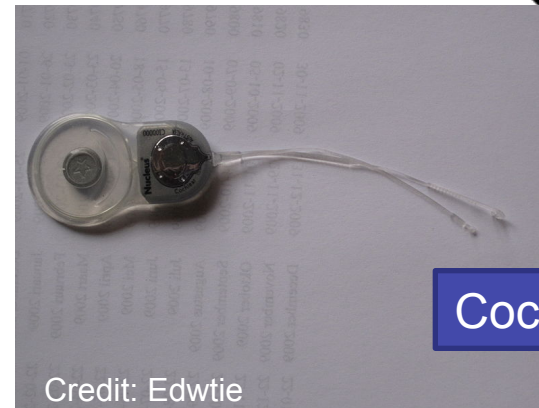
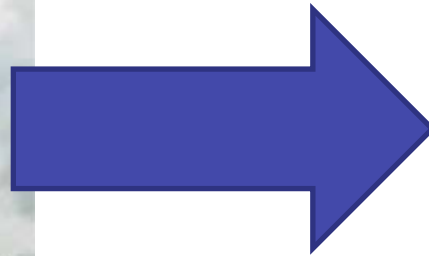


WWII Radar



Radio astronomy

Credit: CSIRO

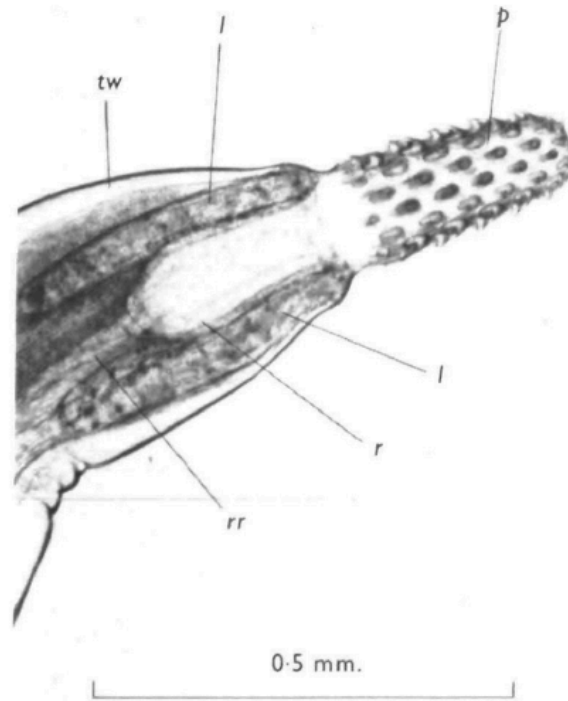


Cochlear implant

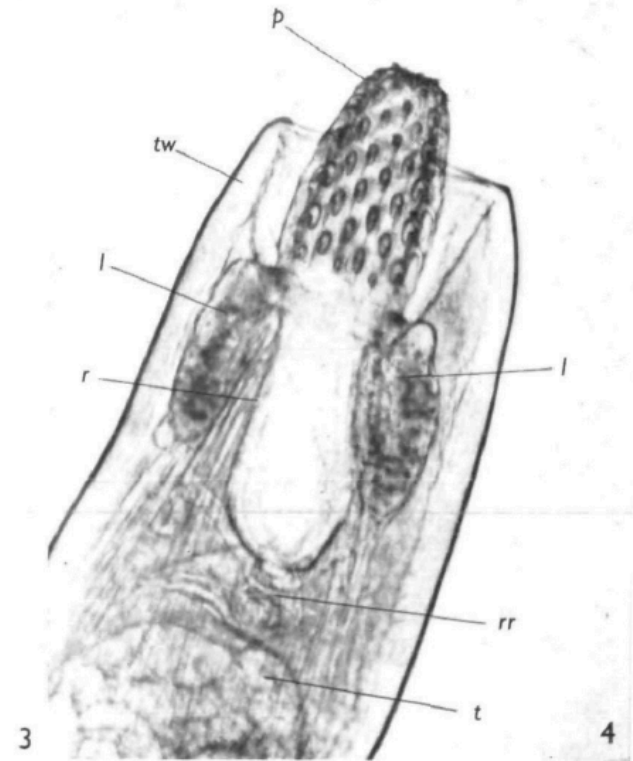
Credit: Edwtie

<http://en.wikipedia.org/wiki/File:Cochearimplants.JPG>

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R. A. HAMMOND



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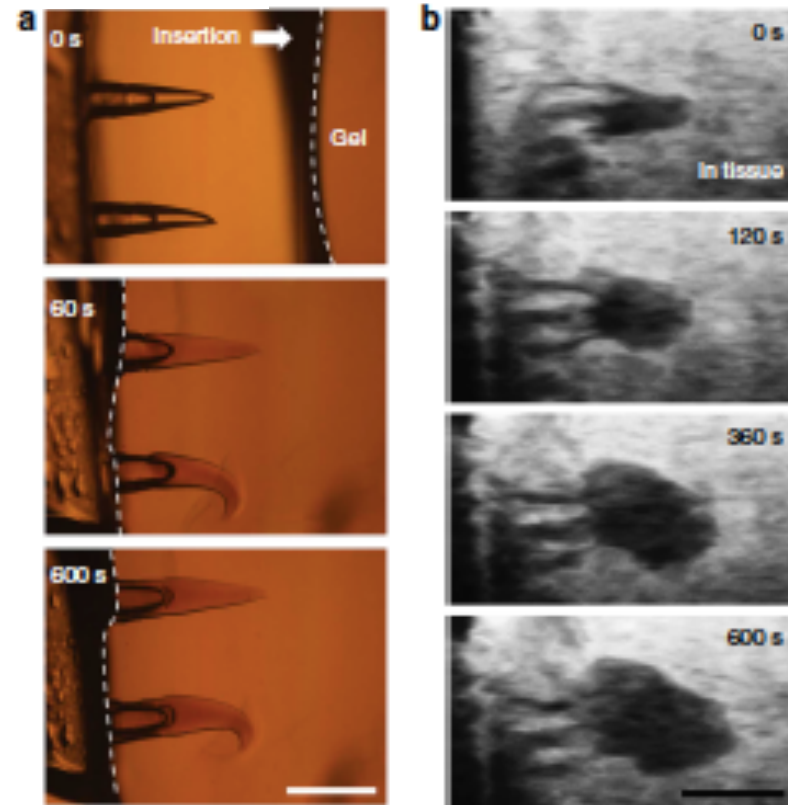
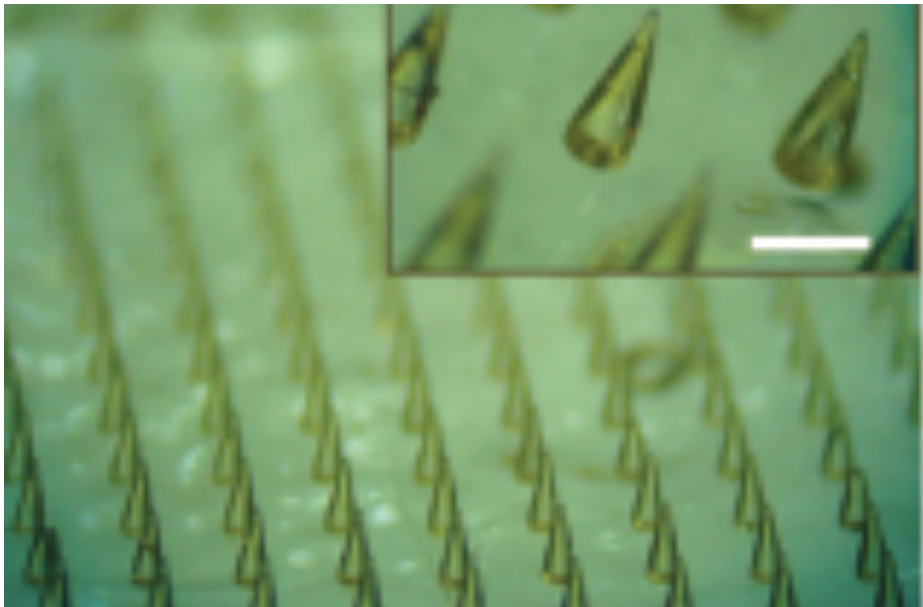
## ARTICLE

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DOI: 10.1038/ncomms2715

# A bio-inspired swellable microneedle adhesive for mechanical interlocking with tissue

Seung Yun Yang<sup>1,2,3</sup>, Eoin D. O’Cearbhaill<sup>1,2,3</sup>, Geoffroy C. Sisk<sup>4</sup>, Kyeng Min Park<sup>5</sup>, Woo Kyung Cho<sup>1,3</sup>, Martin Villiger<sup>6</sup>, Brett E. Bouma<sup>3,6</sup>, Bohdan Pomahac<sup>4</sup> & Jeffrey M. Karp<sup>1,2,3</sup>

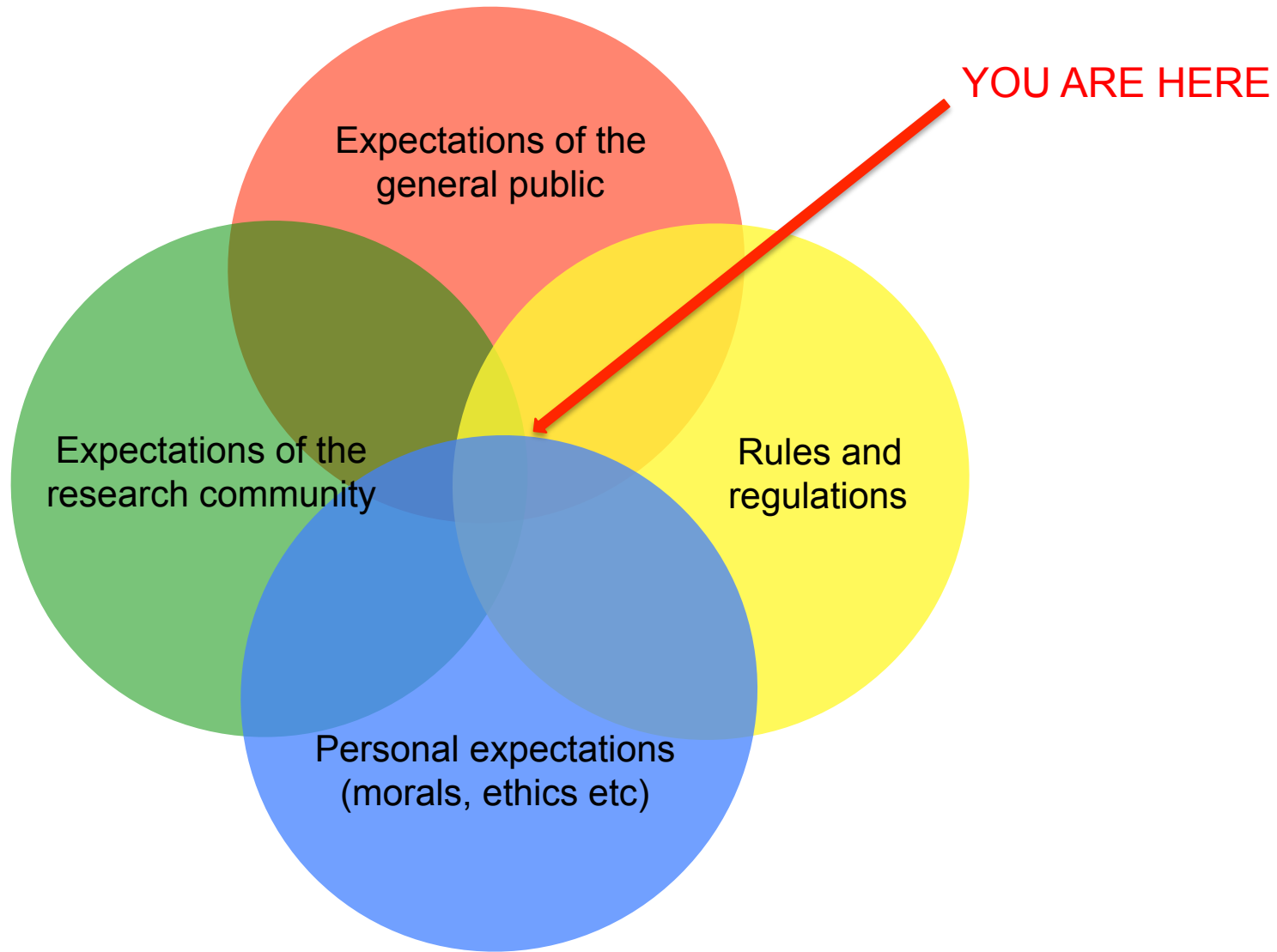




- We don't know when our research might have impact, so we have to do what we can now to make sure that our findings can be trusted
- The list of things that we can do now are the principles of research integrity
- Not only do they help support trust in research, they also help in the production of research that is excellent
- Principles captured in many Code of Conduct for Research
  - Australian Code for the Responsible Conduct of Research
  - Singapore Statement

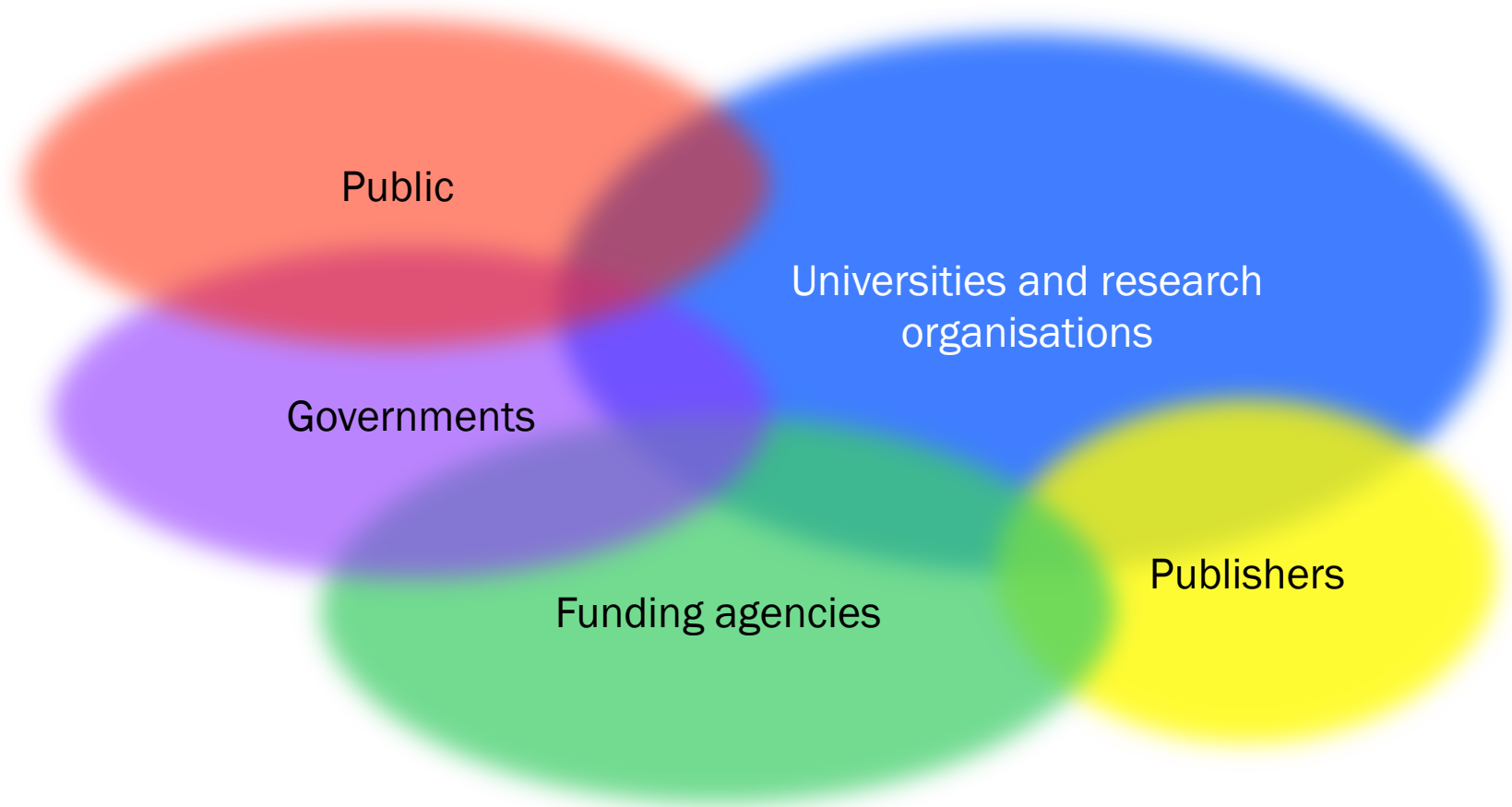


Principle	Practice	Why?
Data and records	Maintained, retrievable, safe, 'owned'	'gold' – reuse and sharing; insurance
Supervision of research trainees	Induct! Provide appropriate environment	the future of research; 'vulnerable'
Publication and dissemination	'Responsible'	track record; performance
Authorship	Must have met requirements; keep record of agreement	track record; recognition; performance
Peer Review	Participate 'responsibly'	contribution to research
Conflict of Interest	Disclose and manage where appropriate	transparency and trust
Collaborations across institutions	Have agreements in place	prevent disputes; clarify responsibilities
Research misconduct	Have processes in place and respond to allegations	transparency and trust





## Research Integrity





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## Cultures of research integrity





- Most strong culture of research ethics and integrity display the following traits
  - Voice from the top
  - Training and education
  - Clear expectations



## 4 key areas of response by OREI

(i) Clarifying expectations	(ii) Building cultures	(iii) Providing support	(iv) Gathering evidence



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Student researchers



- Student researchers vs research students
  - Do we treat this cohort primarily as students or as researchers?
  - Researchers first, students second
- In practice, this means that our expectations on students researchers are the same as they are on researchers
- Recognise that there is a power imbalance and so that for some students questioning or challenging their supervisors is a difficult thing to do
- How do we address this?



- One of the three things...
- Making sure that student researchers have a clear understanding of the principles of research integrity (that are hopefully captured in policy) lets them ask a question
  - ‘If the policy says this, why are we doing that?’
- Bottom-up or grass roots approach to culture change



- Implementing a commercially available product from Epigeum
- Covers the principles of research ethics and integrity, including publication ethics
- Broadly discipline specific streams that allow coverage of areas where there is a spectrum of accepted practice (authorship, data management)
- Will be a requirement for all commencing PhD students to complete in their first year (prior to confirmation)

- Subject offered as part of MSc degree
- Small group – optimally about 40 students (but has been up to 90)
- Subject developed by Associate Professor Laura Parry and Dr Kath Handasyde, Zoology
- Covers the principles of research integrity, including authorship, publication, peer review, conflict of interest
- Lecture followed by workshop
- Part of assessment is peer review of other students work; marks are given for the quality of the peer review that they undertake



- On publication and authorship (amongst others) to
  - Undergraduates in Microbiology and Immunology
  - Science faculty post-doc network
  - Plagiarism workshop in Paediatrics
- Important part of all of these approaches is the opportunity to discuss the principles and practice thinking about what they mean in each research context

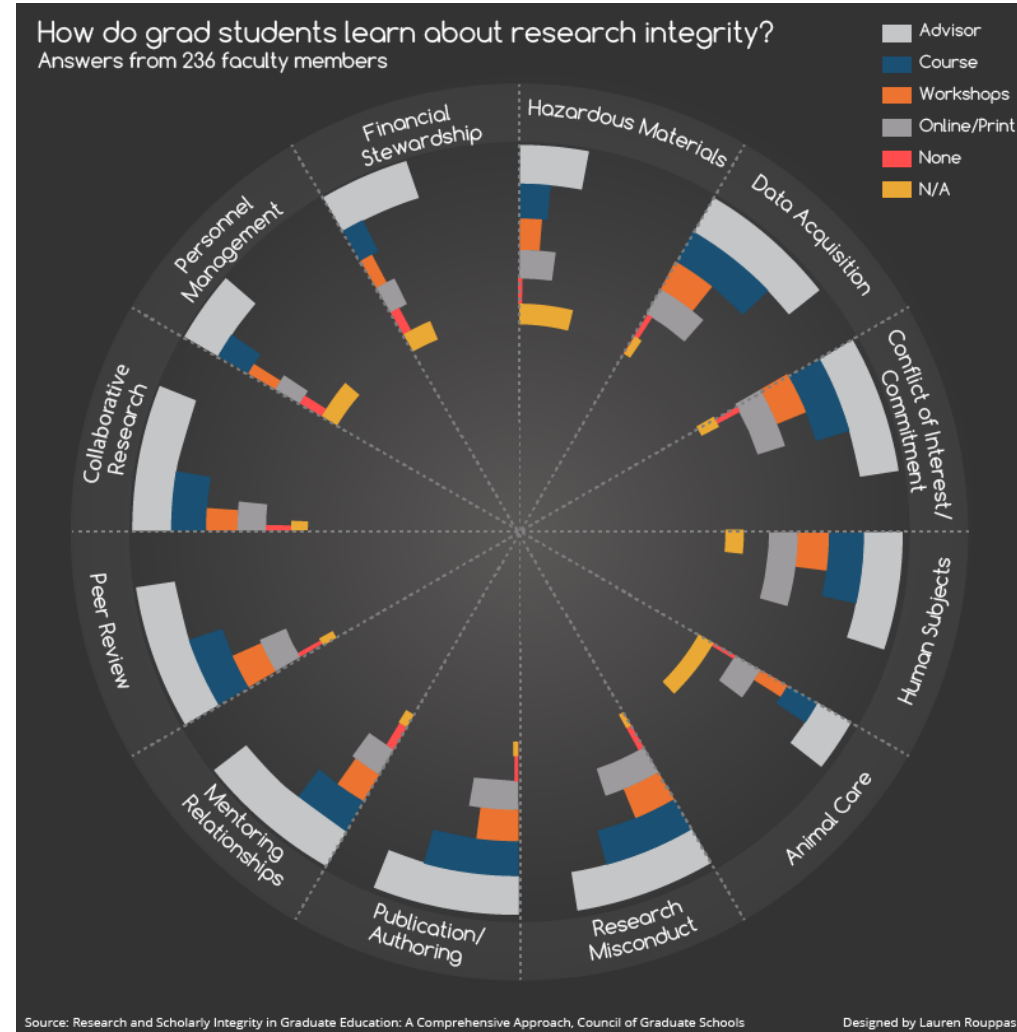




Student researchers and publication ethics –  
Roles and responsibilities of supervisors and  
institutions



- Survey of supervisors suggests that they are a key point of information about publication ethics
- *Discipline differences?*
- *Implications for programmatic research degrees?*
- *What do the student researchers think?*





According to the Australian Code:

Supervisors of research trainees should...



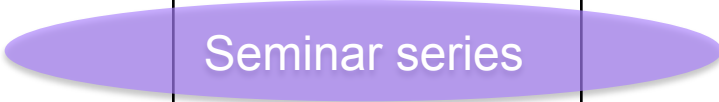




- Ensure training
- Mentor and provide support
- Ensure valid and accurate research
- Ensure appropriate attribution
  
- *These appear intrinsic to research conduct*
- *How much training do supervisors require to fulfill these responsibilities?*
- *How do these match to incentives?*



- Most strong culture of research ethics and integrity display the following traits
  - Voice from the top
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  - Clear expectations



## 4 key areas of response by OREI

(i) Clarifying expectations	(ii) Building cultures	(iii) Providing support	(iv) Gathering evidence
	   		 

- Shift from rules to principles
- Components covered:
  - The University code of conduct for research
  - Research integrity
  - Processes for the handling of allegations of research misconduct
  - Human research ethics
  - Animal ethics and welfare
  - Biorisk





# We started with authorship

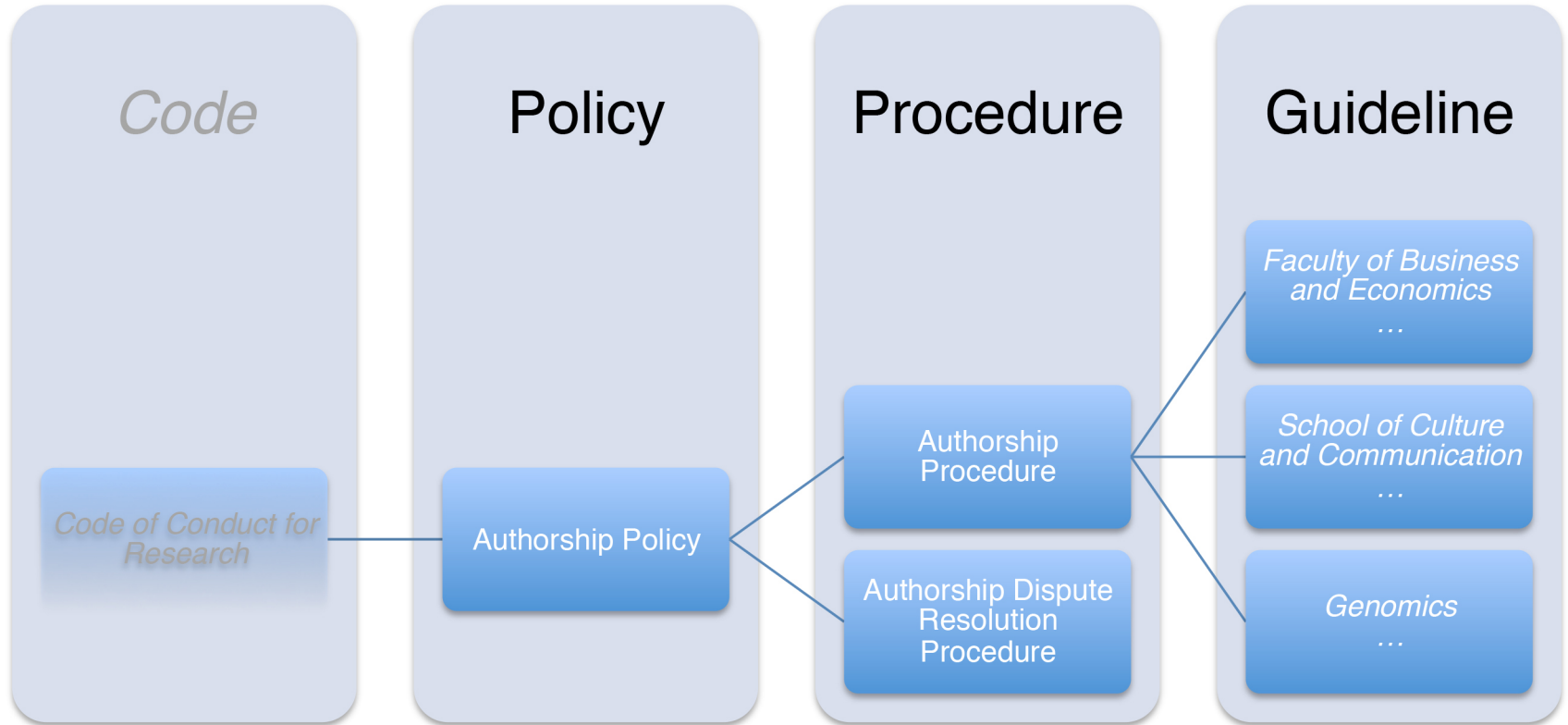


Authorship is a complex ecosystem



- Principles-based policy [go.unimelb.edu.au/2asn](https://go.unimelb.edu.au/2asn)
- Principles: *Honesty, fairness, consistency, transparency and generosity within requirements*
- Significant intellectual or scholarly contribution and accountability that contribution
- Talk early and often
- Agree on authorship
- Describe contributions
- Researchers must recognise contributions of student researchers





→ Instruction

Mandatory

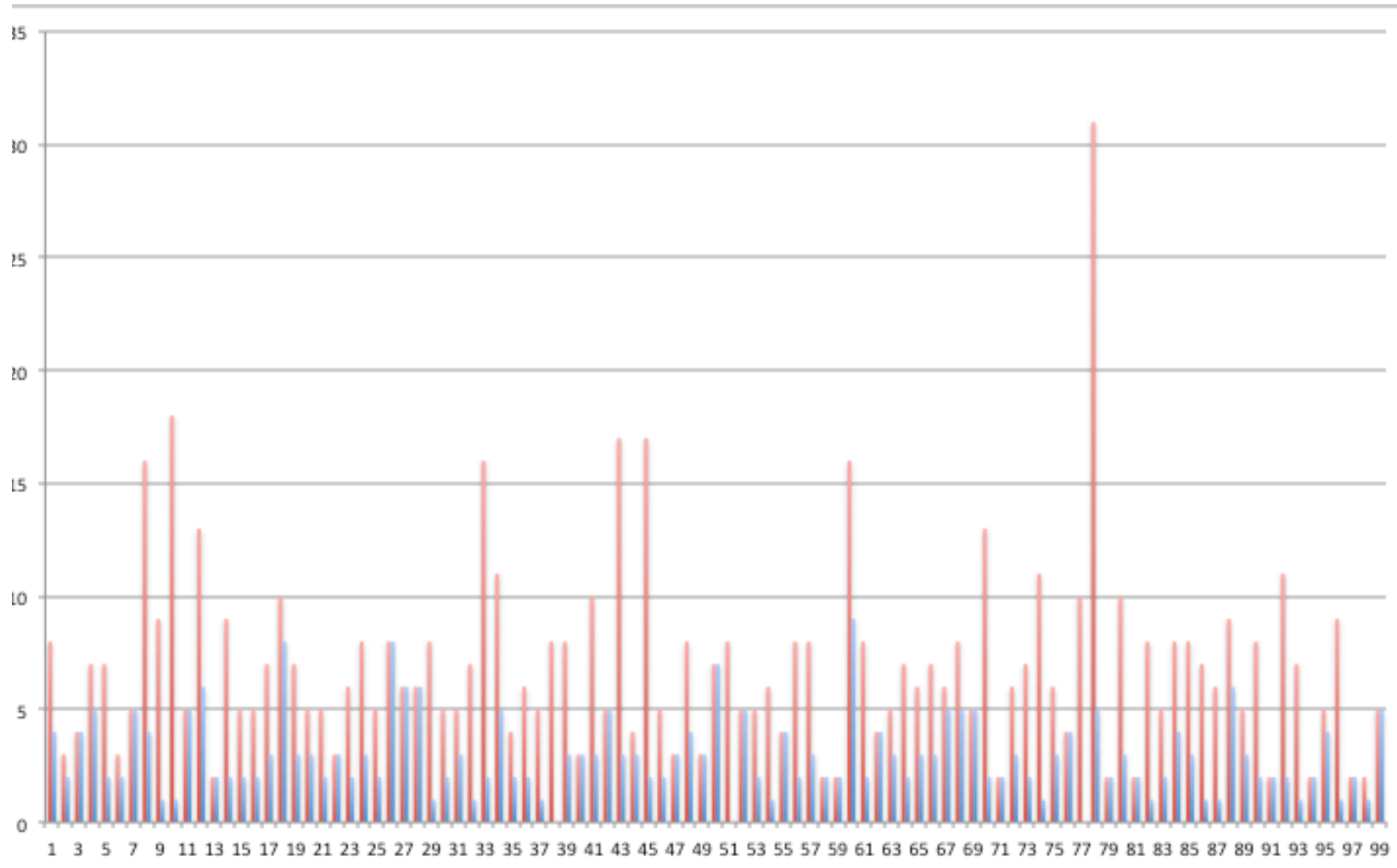
Based on Principles

The ICMJE recommends that authorship be based on the following 4 criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
2. Drafting the work or revising it critically for important intellectual content; AND
3. Final approval of the version to be published; AND
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

- *Can anyone be an author according to these criteria?*
- *How can student researchers fulfill these?*

- The attribution of authorship criteria described by ICMJE are used widely and affect key documents such as codes of conduct.
- However, they are not used by many publishers including *Nature*, *Science*, *PNAS*.
- The criteria doesn't work when used by certain journals.



## The policy

- Principles
  - *Honesty and accuracy*
  - *The fulfillment of research and an obligation*
- Communicate research findings
- Acknowledge and cite the work of others and your own
- Disclose funding and conflicts of interest
- Communicate research broadly
- The University supports making research publically available

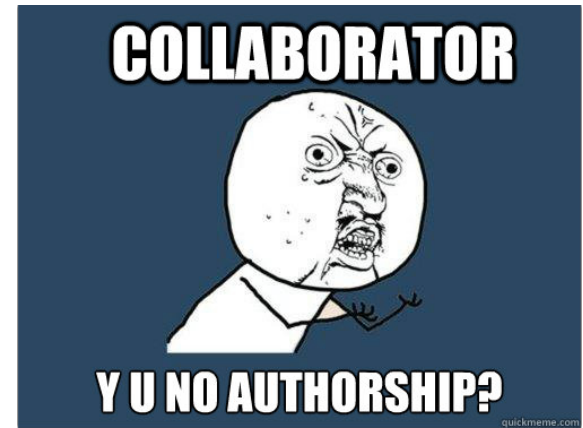
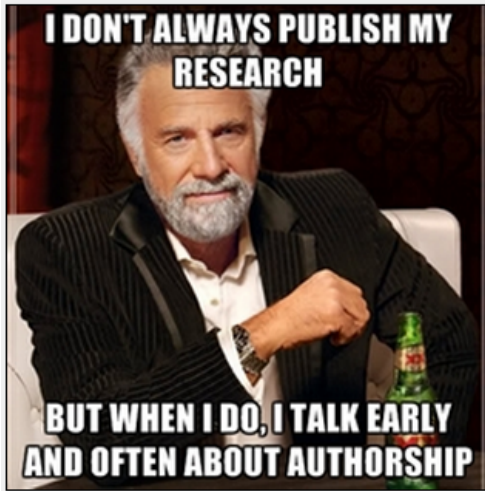


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## Our observations of student researchers and publication ethics



- Everyone is over 18
  - Undergraduate 3<sup>rd</sup> Year student researchers already have a sophisticated understanding of publication ethics
  - Engine-room of research
- Challenges in discussing publication ethics with student researchers
  - Access and scale
  - Appropriate material
  - Linked to discussions with supervisors
  - Discipline conventions are sometimes unhelpful
- Research misconduct is committed by student researchers
  - Culpability



- Research integrity - publication ethics - makes research trustworthy and excellent
- Student researchers exist in an imbalanced power relationship, are learning how to research, but are researchers





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Thank you!