

# Phase 2: Research Practice (Designing and Executing Research): DEng Program: Research Integrity, Safety, and Ethics in Engineering

4 June 2026

**Presenter: Emeritus Professor Akhtar Kalam**

EIT EMERITUS PROFESSOR

[Watch Webinar Recording Here](#)



# About EIT

We are dedicated to ensuring that you receive a world-class education and gain skills that you can immediately implement in the workforce.



## World-Class Australia Accredited Education

Our vocational programs and higher education degrees are registered and accredited by the Australian Government. We have programs that are also recognized under three international engineering accords.



## Engineering Specialists

EIT is one of the only institutes in the world specializing in Engineering. We deliver professional certificates, diplomas, advanced diplomas, undergraduate and graduate certificates, bachelor's and master's degrees, and a Doctorate of Engineering.



## Industry Experienced Lecturers

Our lecturers are highly experienced engineers and subject specialists with applied knowledge. The technologies employed by EIT, both online and on-campus, enable us to source our lecturers from a large, global pool of expertise.



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We deliver our programs via a unique delivery methodology that makes use of live and interactive webinars, an international pool of expert lecturers, dedicated learning support officers, and state-of-the-art such as hands-on workshops, remote laboratories, and simulation software.

# Event Conduct



Please keep discussion lawful and respectful; follow the moderator's directions.  
Do not share illegal or abusive content. Recording is not permitted unless authorised.  
Breaches may lead to removal.

# Introduction – Presenter

## Emeritus Professor Akhtar Kalam

Emeritus Professor at Victoria University and EIT.

Academic Director and Chair of the Academic Board - Texila College Australia.

Director of Al-Kalam Educational Solutions.

Editor-in-Chief of AJEEE

Distinguished Professor/Adjunct Faculty in Australia, India, Malaysia and Oman.

He has published over 610 publications in his area of expertise and has written over 29 books.

Supervised 51 postgraduate research students to graduation, including 39 PhD's and 12 MEngs. Currently, 10 postgraduate research students (four PhD students at VU and six DEng students at EIT) are being supervised.

Public, University, and Motivational Lecturer.

Consultant for the electricity supply industries in Australia and overseas.

Assisted in change management plans for Universities and the higher education sector.

### Education

The University of Bath, Bath, UK, D.Eng., Electrical Engineering

The University of Oklahoma, Norman, USA, MS, Electrical Engineering

Aligarh Muslim University, Aligarh, India, BSc. Eng., Electrical Engineering

St Xavier's College, Calcutta, India, Applied Science

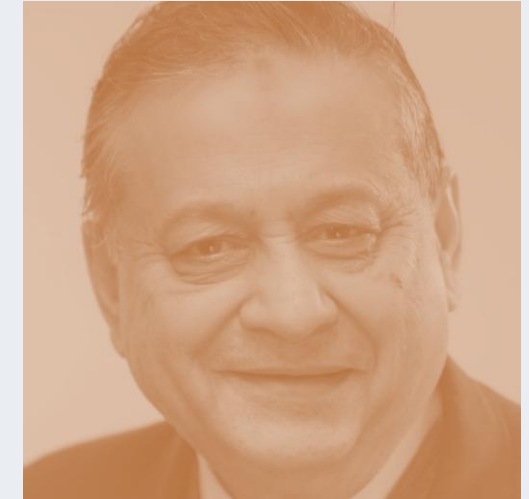
### Professional Society Activities

Australian Institute of Energy – Fellow

Engineers Australia – Fellow

The Institution of Engineers and Technology, UK – Fellow.

The Institution of Electrical and Electronic Engineers, USA –Life Senior Member.



*“My vision is to provide exciting higher education science and engineering courses, research, consultancy and collaborate in development work of the industry and communities within Australia and beyond.”*

# Agenda

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1.	Session Objectives
2.	DEng Research Lifecycle
3.	Research Integrity Framework
4.	Human Research Ethics
5.	Engineering Safety
6.	Research Data Management
7.	Engineering Ethics Case Study
8.	Key Takeaways



# Session Objectives

- Understand research integrity principles
- Examine ethics in engineering research
- Explore safety responsibilities



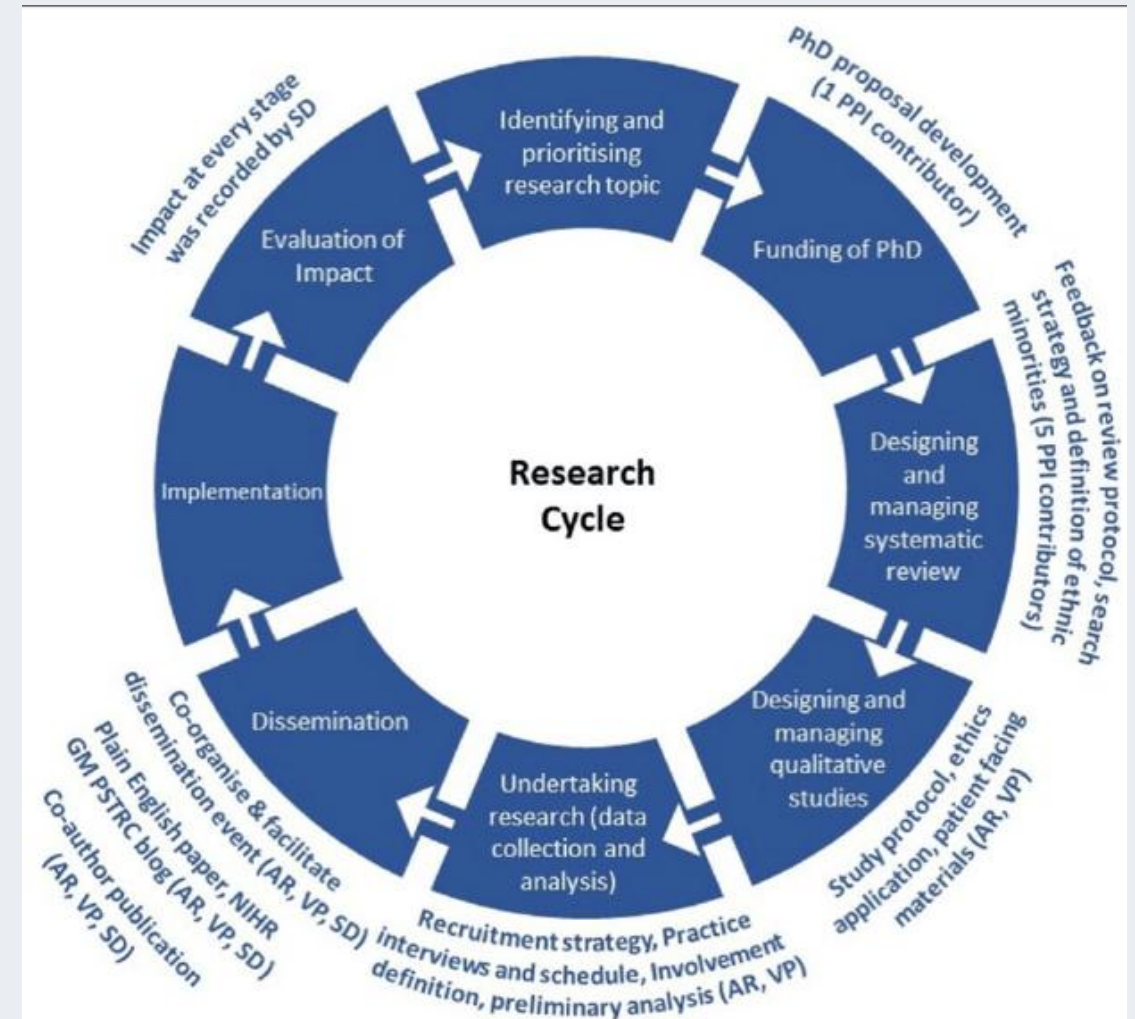
# Why Research Integrity Matters?

- Trust in science
- Public accountability
- Research reputation



# DEng Research Lifecycle

- Idea generation
- Proposal
- Ethics approval
- Data collection
- Analysis



# What is Responsible Research?

- Honesty
- Transparency
- Accountability

**STEWARDSHIP COMPASS**



The diagram is a circular compass with a gold border. At the center is a red and blue star with the text "YOUR STEWARDSHIP PURPOSE". The compass is divided into four quadrants, each with a label: "LONG-TERM VIEW" (top-left), "OWNERSHIP MENTALITY" (top-right), "CREATIVE RESILIENCE" (bottom-right), and "EXISTING ORGANISATIONAL AND PERSONAL VALUES" (bottom-left). The word "INTERDEPENDENCE" is written vertically on the left side of the compass.

**STEWARDSHIP ASIA**

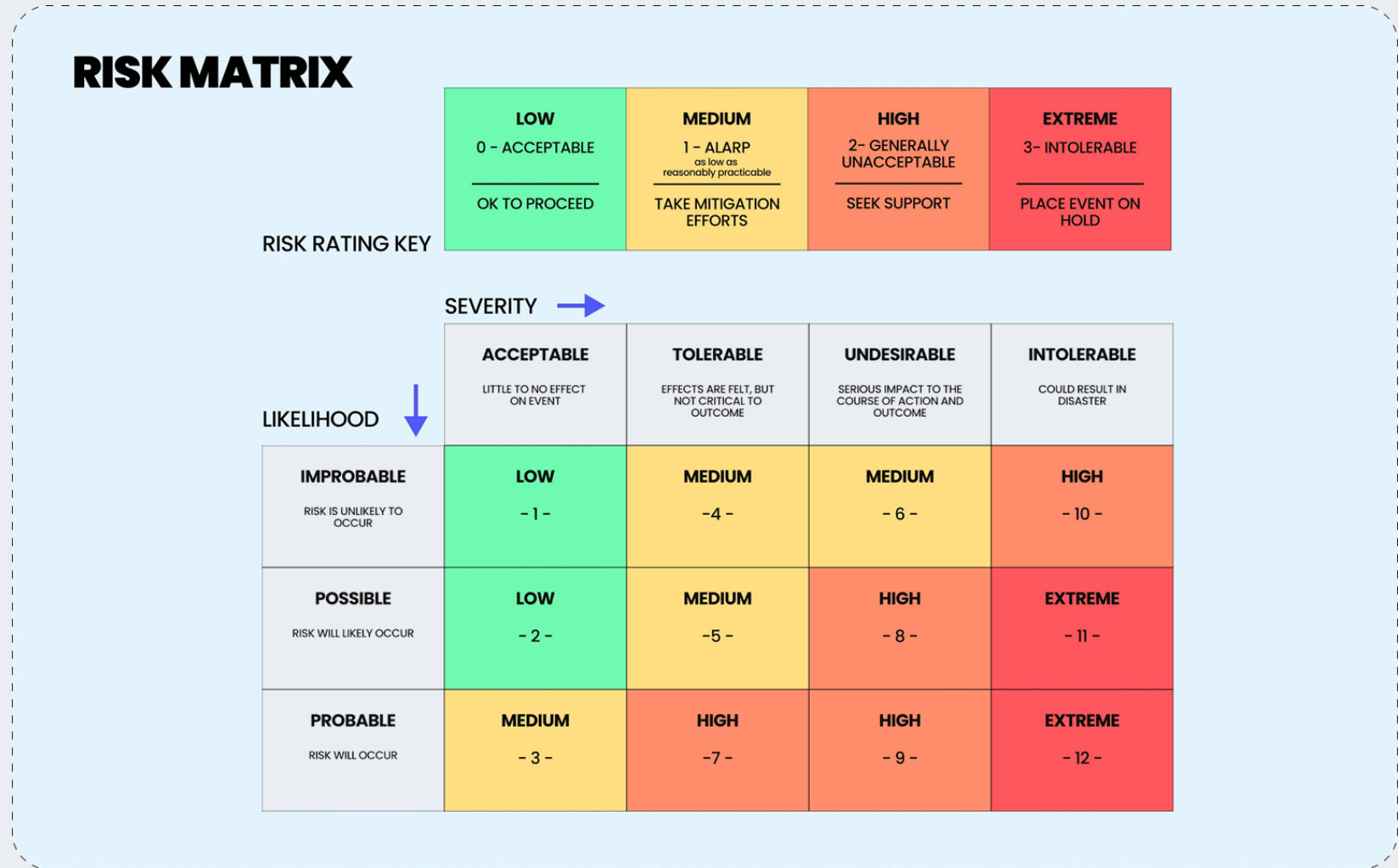
**STEWARDSHIP** IS THE MINDSET AND PRACTICE OF CREATING VALUE BY INTEGRATING THE NEEDS OF STAKEHOLDERS, SOCIETY, FUTURE GENERATIONS AND THE ENVIRONMENT.

**STEWARDSHIP IS ENABLED BY STEWARD LEADERSHIP**

1. Identify your personal and/or organisational values
2. Add four core stewardship values
3. Based on these values, articulate a purpose that creates a collective better future for a variety of stakeholders including shareholders, and society at large
4. Ensure that everything you and the organisation do, is aligned to and governed by the compass

# Engineering Research Risks

- Human risks
- Environmental risks
- Technical risks



# Australian Research Context

- National standards
- University policy

<p><b>Fairness</b> in the treatment of others</p> 	<p><b>Promotion</b> of responsible research practices</p> 	<p><b>Honesty</b> in the development, undertaking and reporting of research</p> 	<p><b>Accountability</b> for the development, undertaking and reporting of research</p> 	<p><b>Recognition</b> of the right of Aboriginal and Torres Strait Islander peoples to be engaged in research that affects or is of particular significance to them</p> 
<p><b>Rigour</b> in the development, undertaking and reporting of research</p> 	<p><b>Transparency</b> in declaring interests and reporting research methodology, data and findings</p> 	<p><b>Respect</b> for research participants, the wider community, animals and the environment</p> 		

# Research Integrity Framework

- Ethics
- Transparency
- Reproducibility



# Principles of Research Integrity

- Honesty
- Fairness
- Respect

## Personal Character



Humility



Gratitude



Patience



Wisdom



Empathy



Responsibility



Integrity

# Research Misconduct Overview

- Fabrication
- Falsification

## PLAGIARISM: THE WARNING SIGNS

A HIGH LOW 'SIMILARITY' SCORE IN TURNITIN

UNEVEN WRITING

'LOOSE' REFERENCING

INCORRECT OR BIZARRE USE OF WORDS

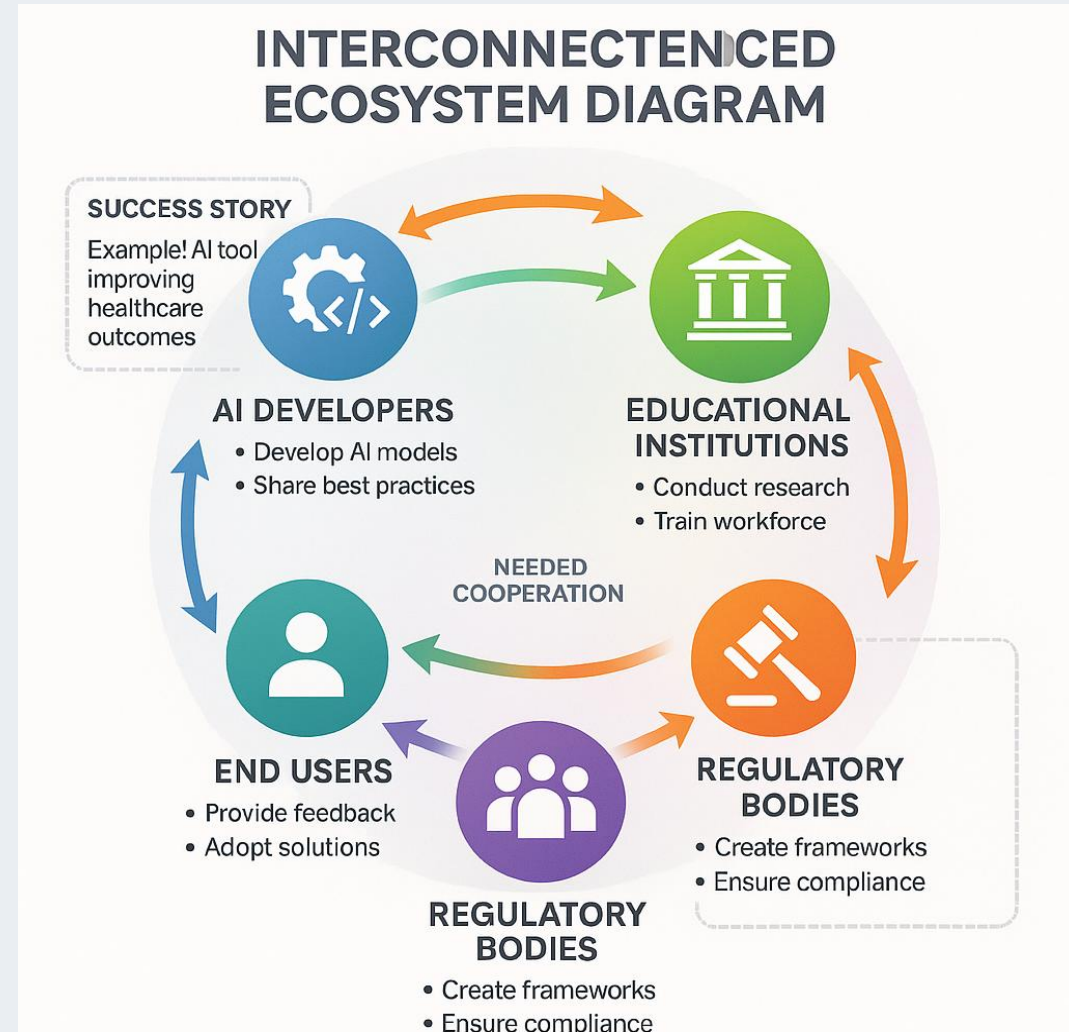
INCONSISTENT USE OF TENSE

INCONSISTENT FORMATTING

UNREFERENCED FACTS, IDEAS, DEFINITIONS ETC

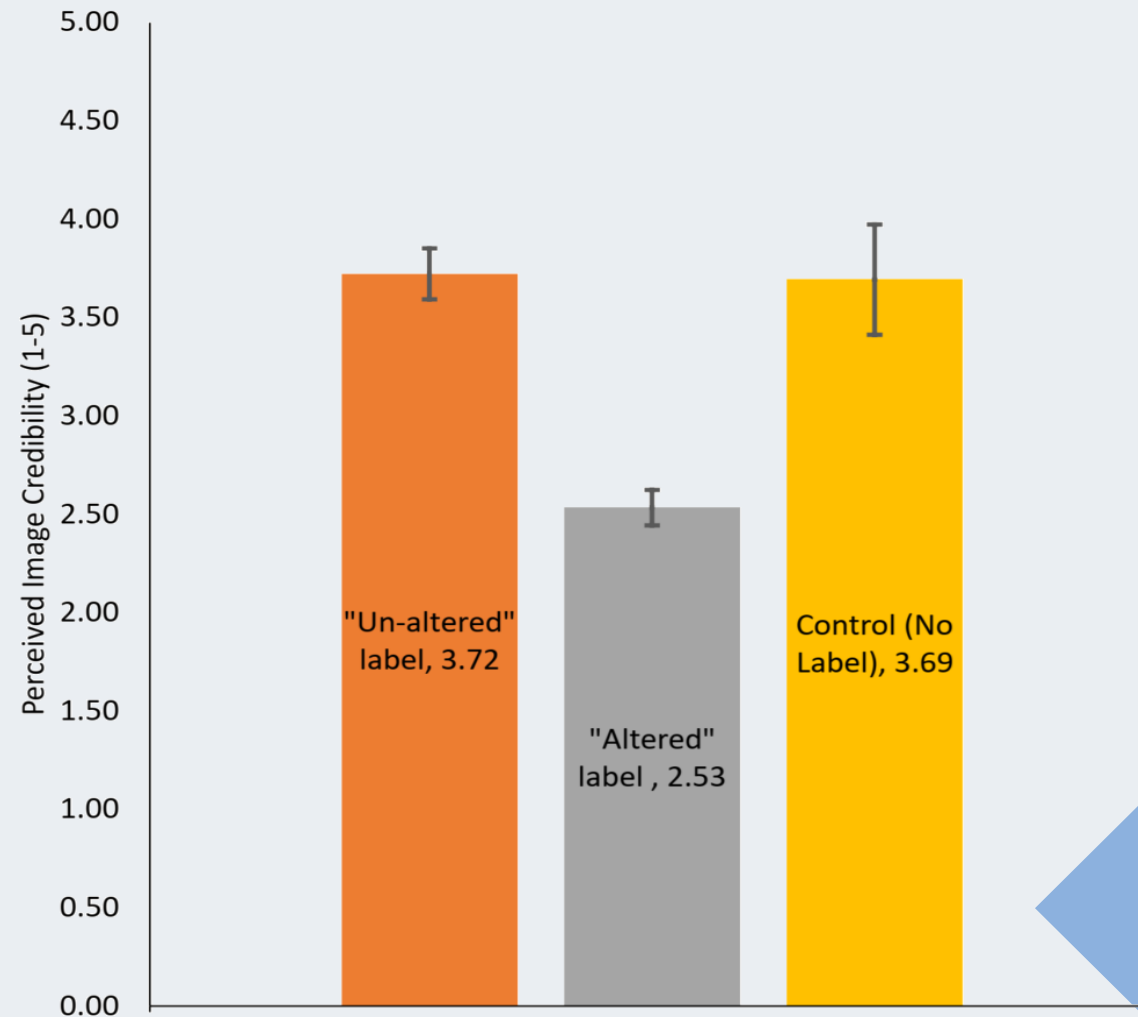
# Fabrication

- Inventing results



# Falsification

- Manipulating results



# Plagiarism

- Text plagiarism
- Idea plagiarism



 <p>Disclose the reuse of prior content</p>	 <p>Cite your work properly</p>	 <p>Reframe ideas with new analysis</p>
 <p>Use AI tools for originality and rewriting</p>	 <p>Create new research and analysis</p>	 <p>Keep detailed records of your work</p>

# Questionable Research Practices

- Selective reporting
- Cherry picking

**Duplicate  
Publications &  
Salami Slicing**



# Authorship Ethics

- Contribution criteria
- Order disputes



# Collaborative Research

- Multi-disciplinary research teams
- Communication responsibilities
- Shared data ownership



## How to Manage Global Teams Effectively

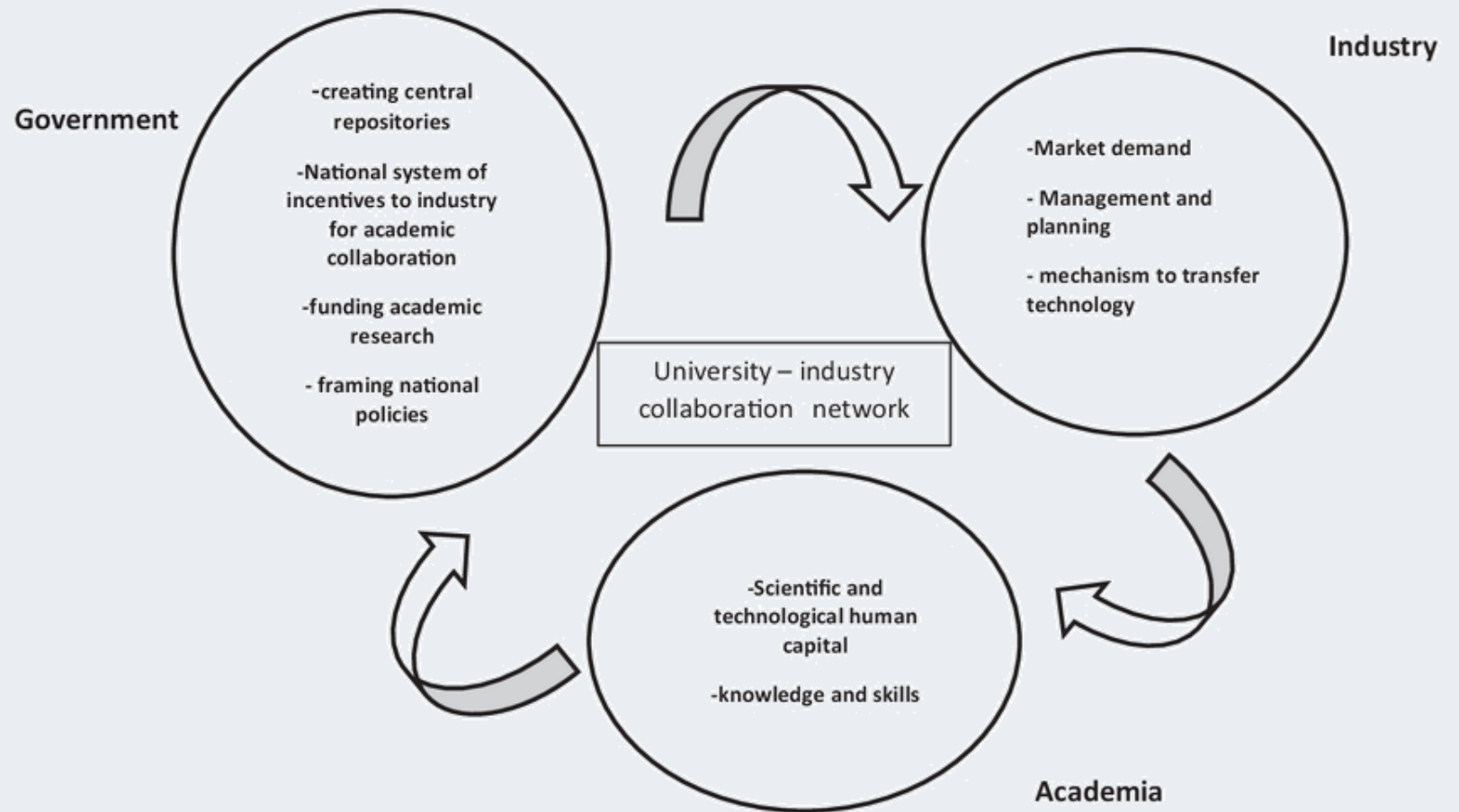
**Bloomfire**

- Set clear goals and expectations
- Establish a Schedule for Collaboration
- Foster Clear Communication and Protocols
- Build Trust and Relationships
- Provide a Centralized Knowledge Base
- Embrace Cultural Differences
- Leverage Technology for Seamless Collaboration

The infographic features a dark purple background with a hexagonal pattern. On the right side, there is a photograph of three professionals (two women and one man) in business attire, looking at a tablet together. The Bloomfire logo is in the top right corner of the infographic.

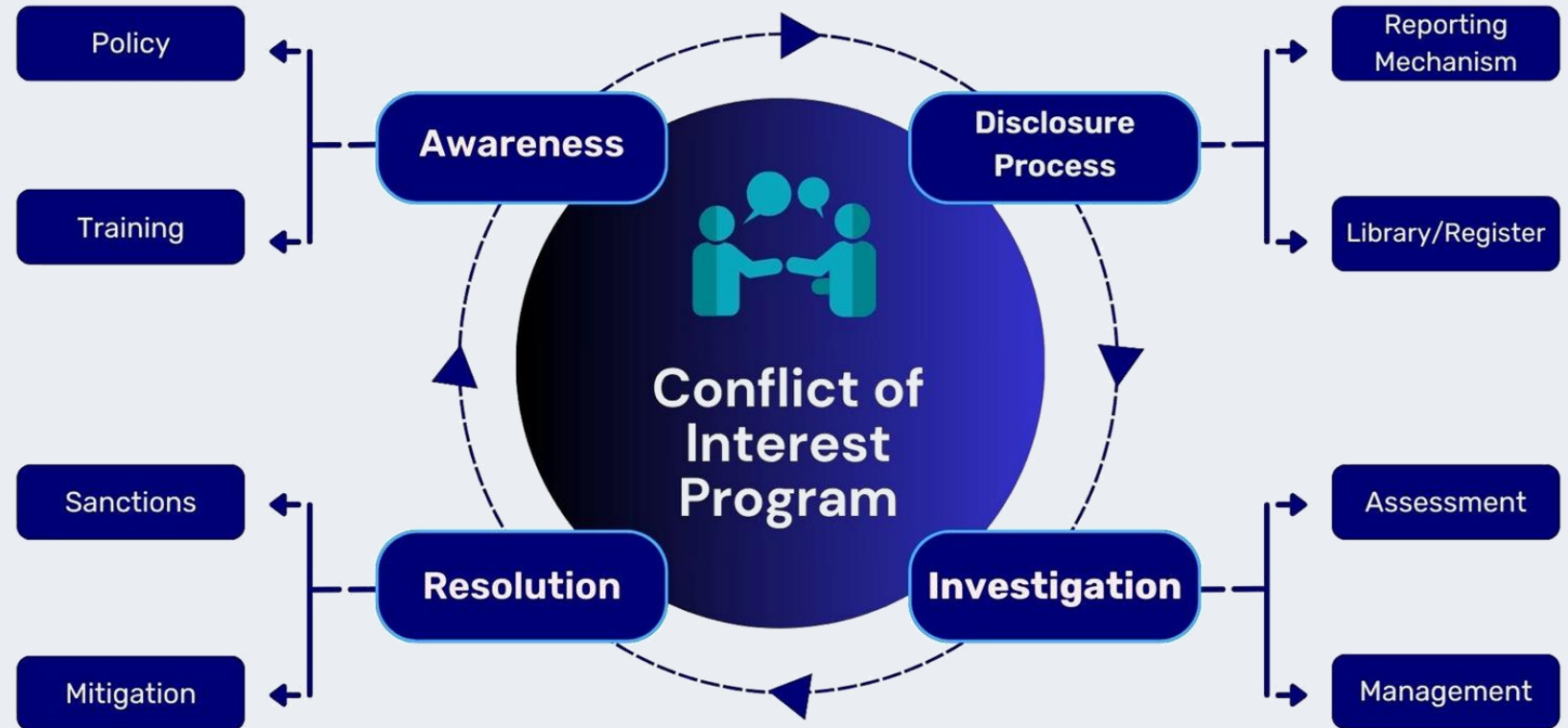
# Industry Partnerships

- Sponsored research
- Confidentiality agreements
- Publication limitations



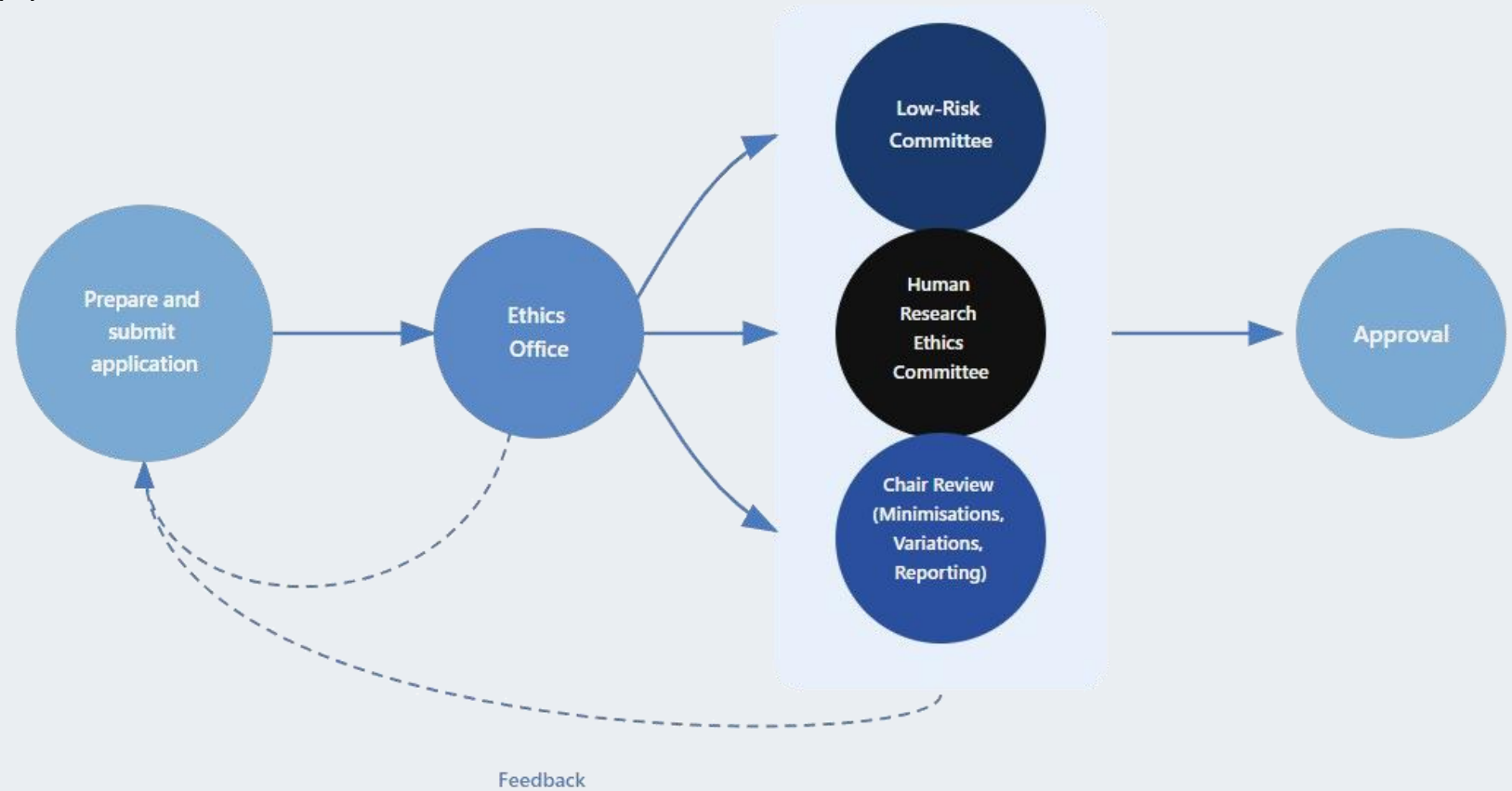
# Conflict of Interest

- Financial conflicts
- Personal conflicts
- Professional conflicts



# Human Research Ethics

- Human participants approval
- Risk minimisation
- Respect and dignity



# Informed Consent

- Voluntary participation
- Risks explained
- Withdrawal rights

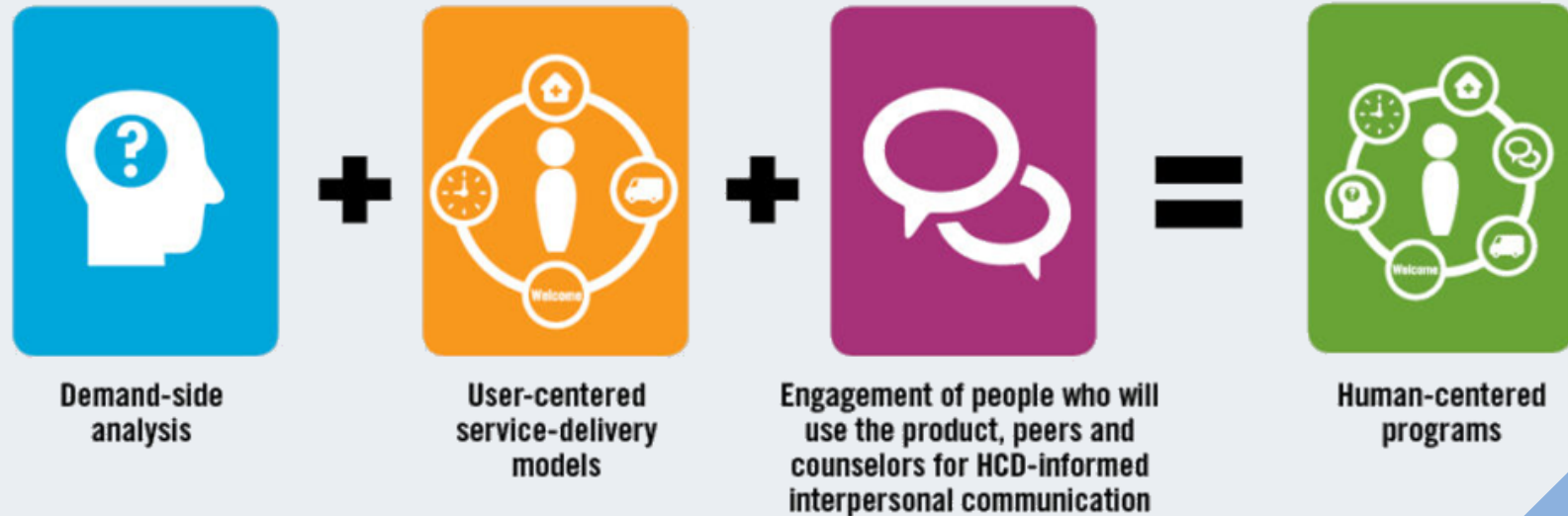


# Vulnerable Participants

- Children
- Elderly participants
- Cognitive impairment

## Human-Centered Design: How it adds up

Human-centered programming is increasingly offered as a solution to public health challenges, but what does it really mean? This simple graphic shows some of the core elements in the equation.



# Privacy & Data Protection

- Personal data protection
- Confidentiality
- De-identification



# Data Security

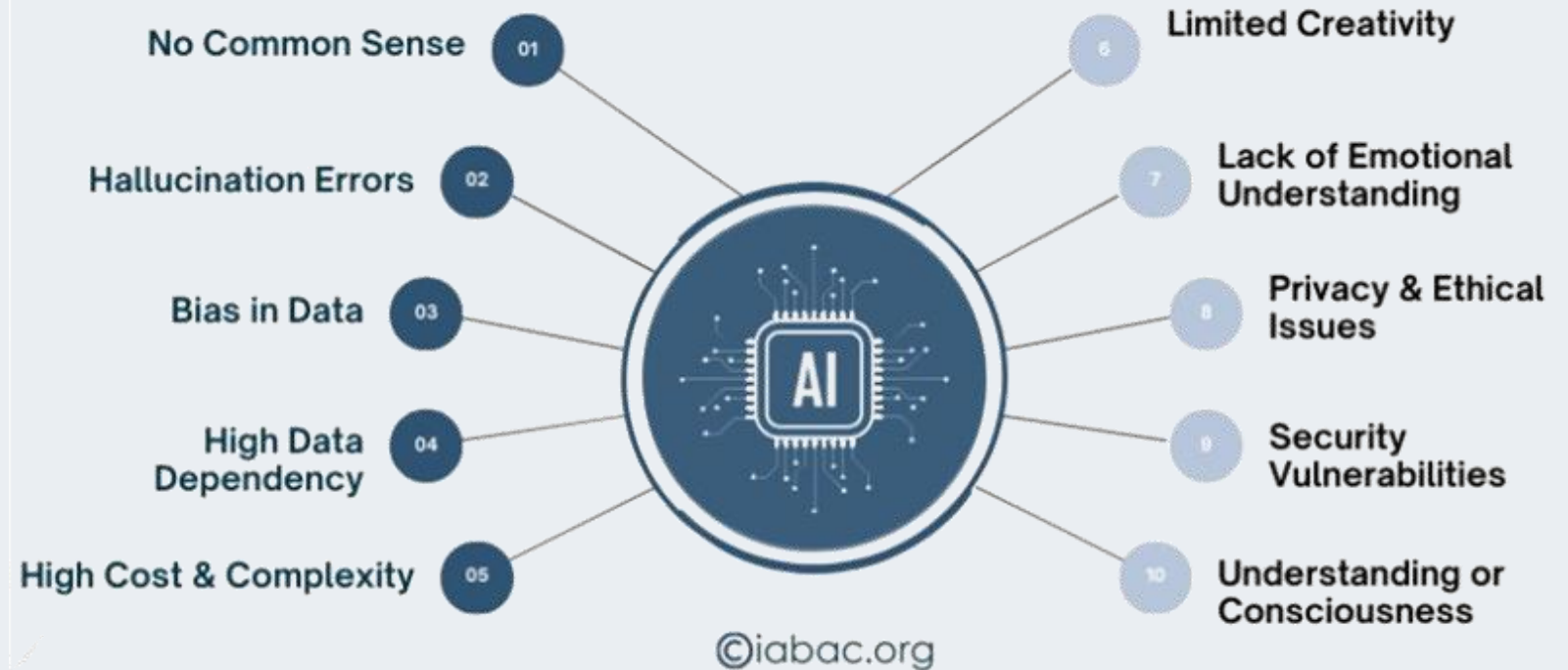
- Encryption
- Access control
- Backup procedures



# AI in Engineering Research

- AI-assisted design
- AI in experimentation
- Predictive systems

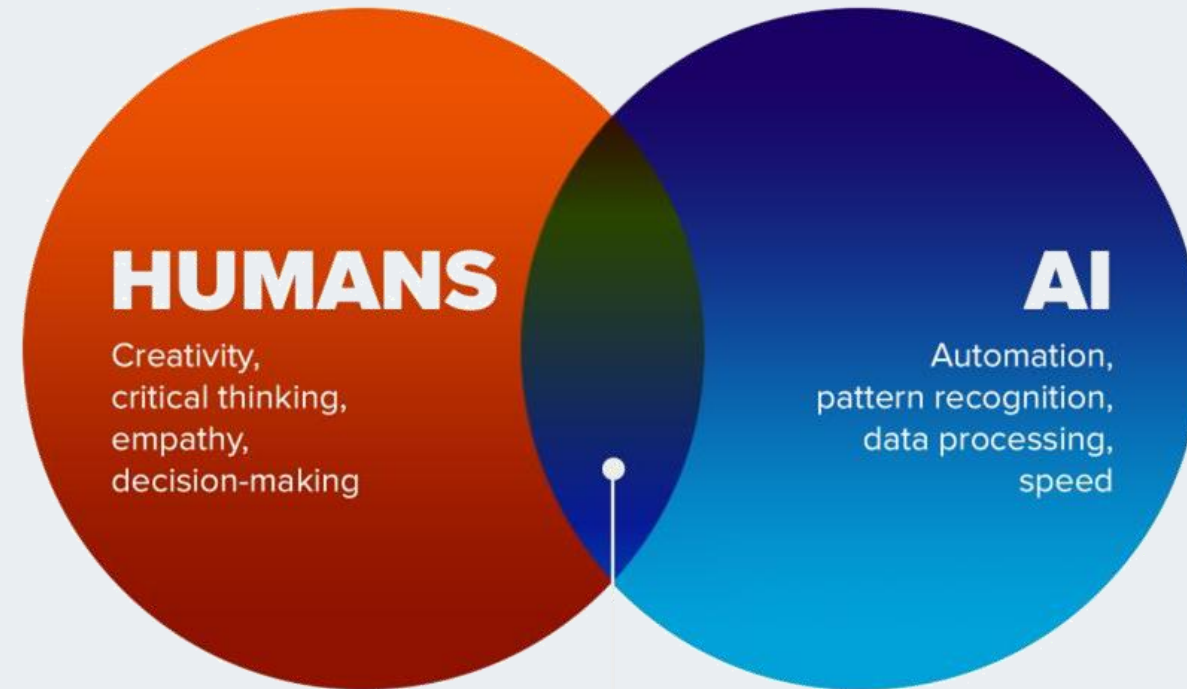
## Top 10 Limitations of Artificial Intelligence (2026)



# Responsible AI Use

- Bias management
- Transparency
- Human oversight

## HUMAN-AI COLLABORATION



Enhanced decision-making- efficiency, faster iteration, data-driven insights

# Generative AI Ethics

- Authorship concerns
- Disclosure requirements
- Hallucination risks



# Laboratory Safety Culture

- Shared responsibility
- PPE
- Safety training

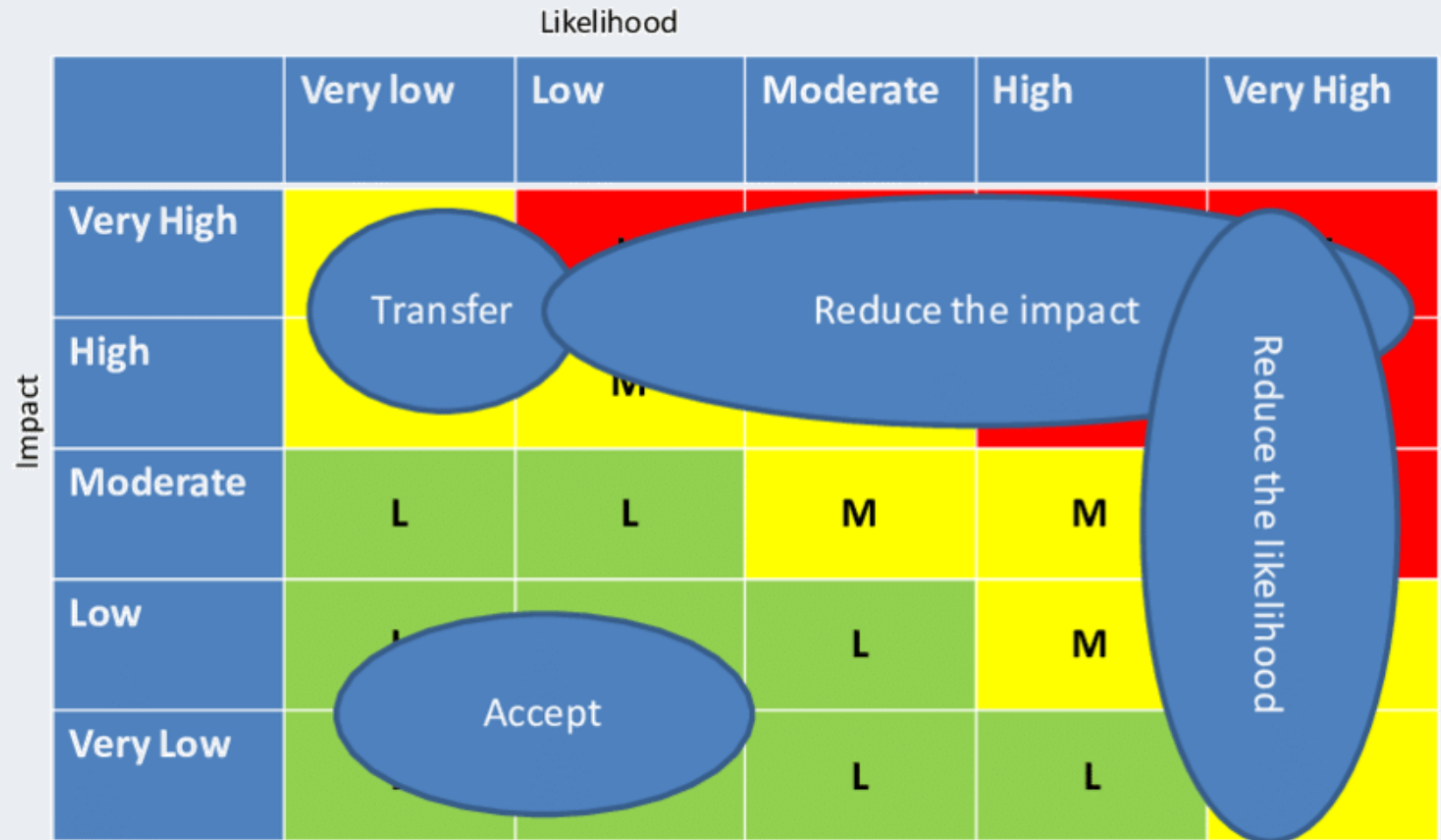


# Engineering Safety

- **Electrical Engineering Safety**
  - › Residual Current Devices (RCDs / GFCIs):
  - › Interlocking Enclosures
  - › Arc Flash Mitigation
- **Mechanical Engineering Safety**
  - › Overload Clutches
  - › Anti-Two-Block Devices
  - › Interlocked Physical Guards
- **Civil and Structural Engineering Safety**
  - › Tuned Mass Dampers
  - › Base Isolation Systems
  - › Breakaway Signposts
- **Software and Control Systems Safety**
  - › Watchdog Timers:
  - › Fly-By-Wire Flight Envelope Protection:
  - › Burner Management Systems (BMS)

# Risk Assessment Methods

- Likelihood
- Consequence
- Risk matrix



# Electrical Safety

- Lockout-tagout
- Grounding
- Isolation procedures



# Chemical Safety

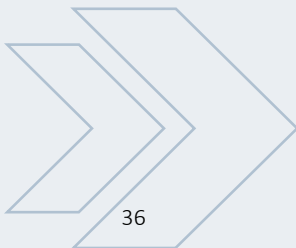
- Safety data sheets
- Labelling
- Storage





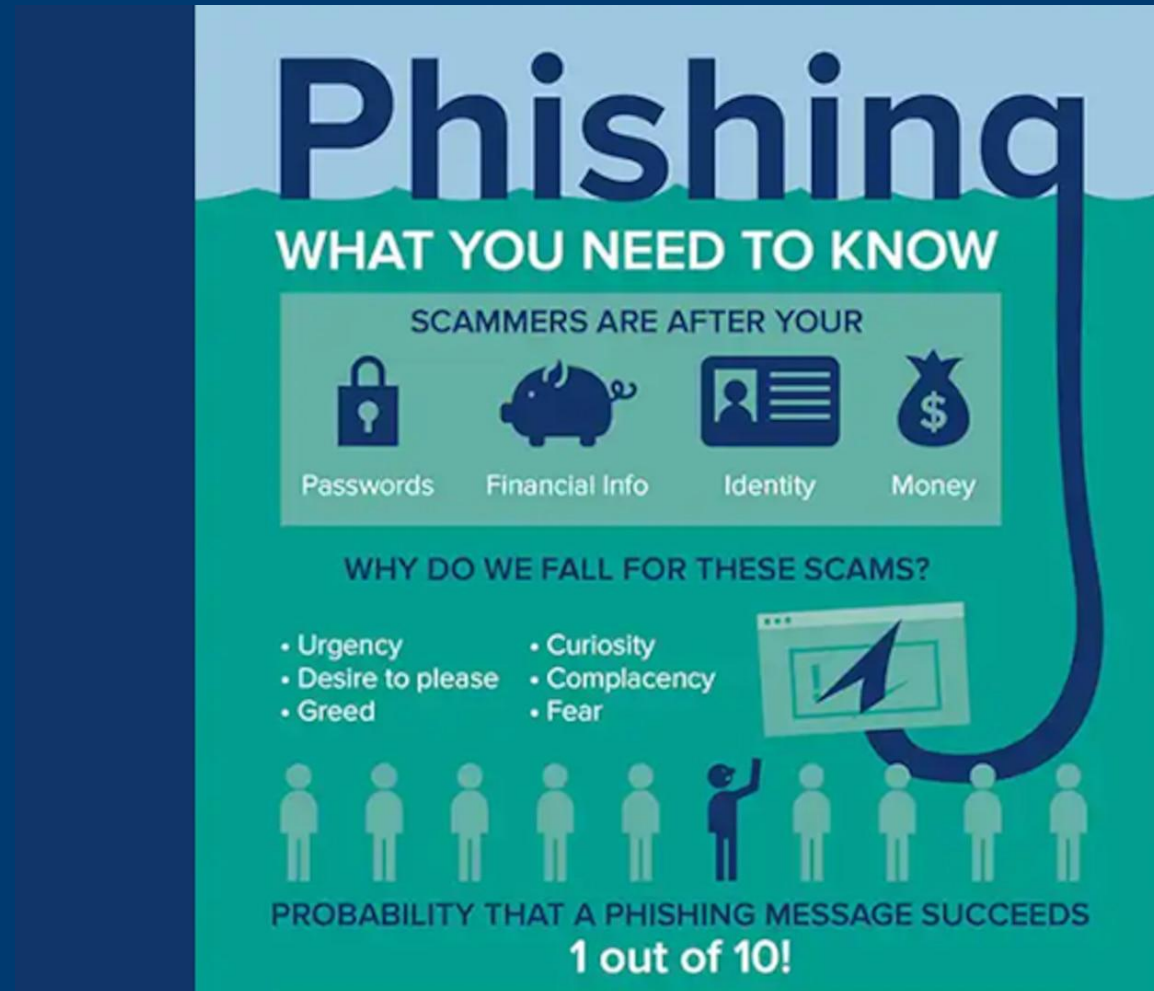
# Fieldwork Safety

- Travel risks
- Environmental conditions
- Emergency communication



# Cybersecurity Safety

- Research data attacks
- Password hygiene
- Secure systems



## Phishing

### WHAT YOU NEED TO KNOW

SCAMMERS ARE AFTER YOUR

- Passwords
- Financial Info
- Identity
- Money

WHY DO WE FALL FOR THESE SCAMS?

- Urgency
- Curiosity
- Desire to please
- Complacency
- Greed
- Fear

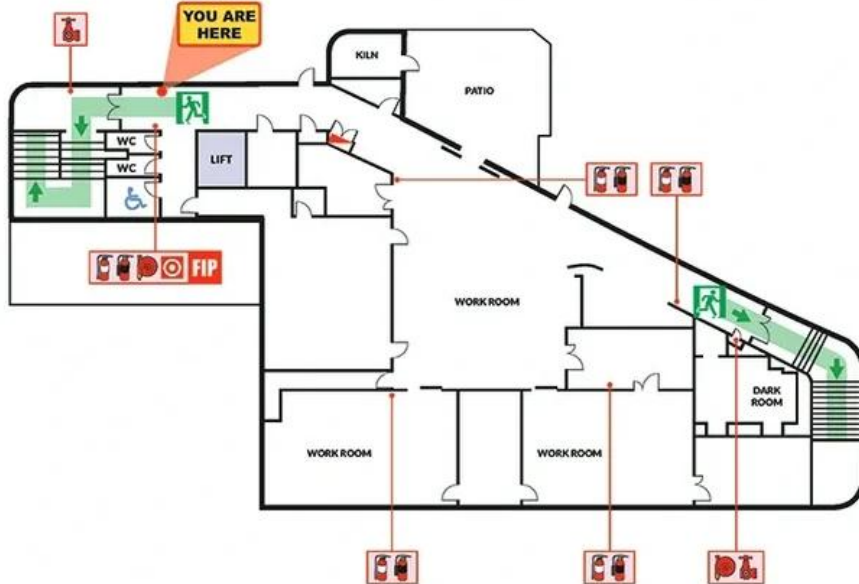
PROBABILITY THAT A PHISHING MESSAGE SUCCEEDS  
**1 out of 10!**

# Emergency Preparedness

- Emergency plans
- Incident reporting
- Evacuation

## EVACUATION DIAGRAM

**CAMPBELL ST, YOUNG NSW 2594**  
LIBRARY / ART - LEVEL 2




### R A C E

**R** REMOVE PERSONS IN IMMEDIATE DANGER.  
DO NOT OBSTRUCT EXITS & EXIT ROUTES.

**A** ALERT PEOPLE NEARBY AND RAISE THE ALARM.  
CALL '000'.

**C** CONTAIN THE EMERGENCY.  
ATTEMPT TO EXTINGUISH THE FIRE OUTBREAK, IF SAFE TO DO SO.  
CLOSE DOORS BEHIND YOU & WHERE POSSIBLE WINDOWS.


**E** EVACUATE TO THE ASSEMBLY AREA.  
LISTEN FOR INSTRUCTIONS.



### LEGEND


Emergency Exit	Fire Extinguisher (CO2)	Electrical Distribution Board	Fire Hydrant
Emergency Egress Path	Fire Extinguisher (DCP)	Fire Hose Reel	Manual Call Point
Assembly Area	Fire Indicator Panel		

### SITE MAP



**AT THE ASSEMBLY AREA**

- Account for people from the building.
- Report any person missing to the Fire Brigade / Responding authorities.
- **DO NOT** re-enter the building until the "All Clear" is given by the responding Emergency Services.

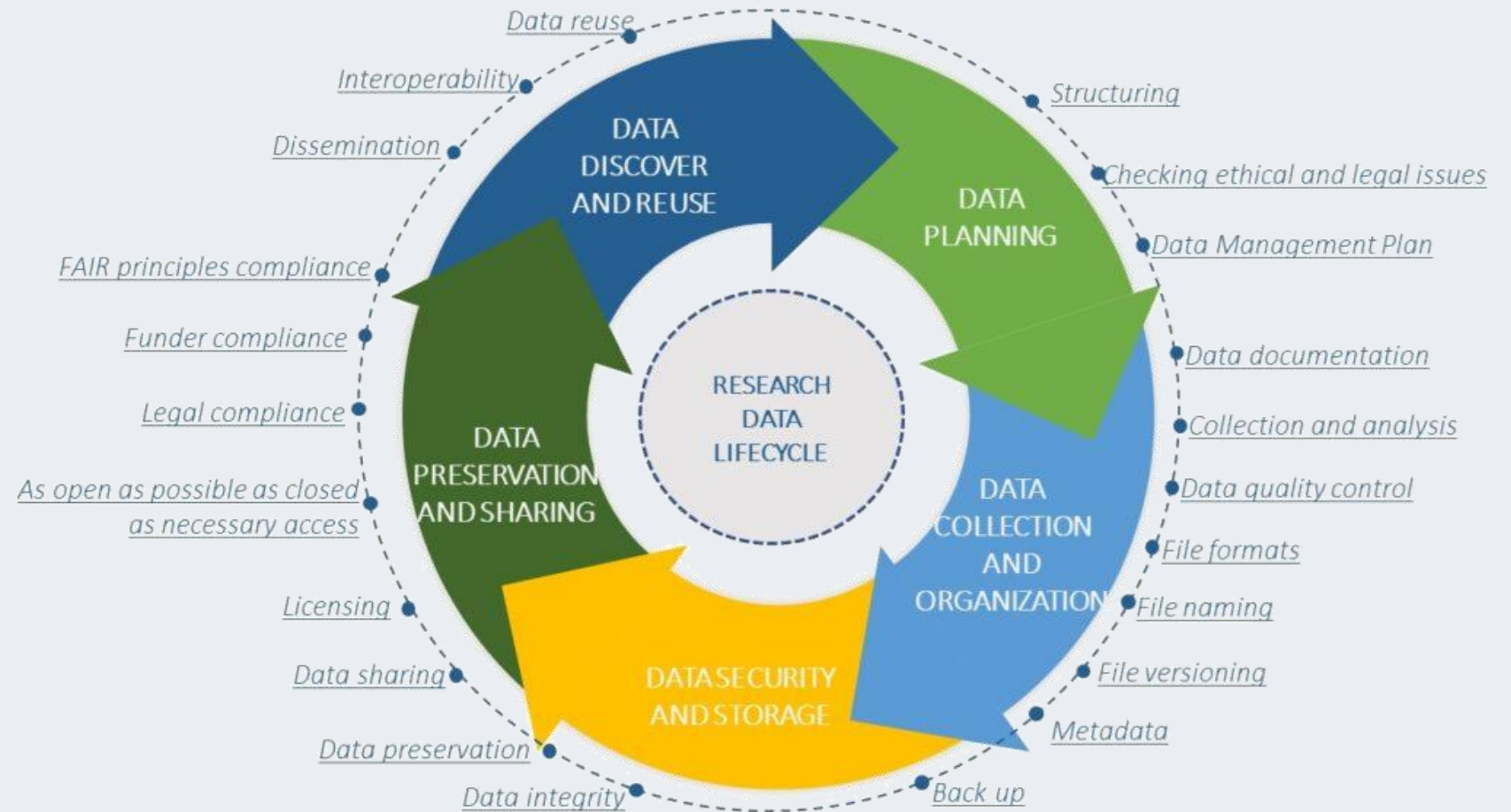


Issue date: 23/06/25  
Expiry date: 23/06/30  
Doc: 10

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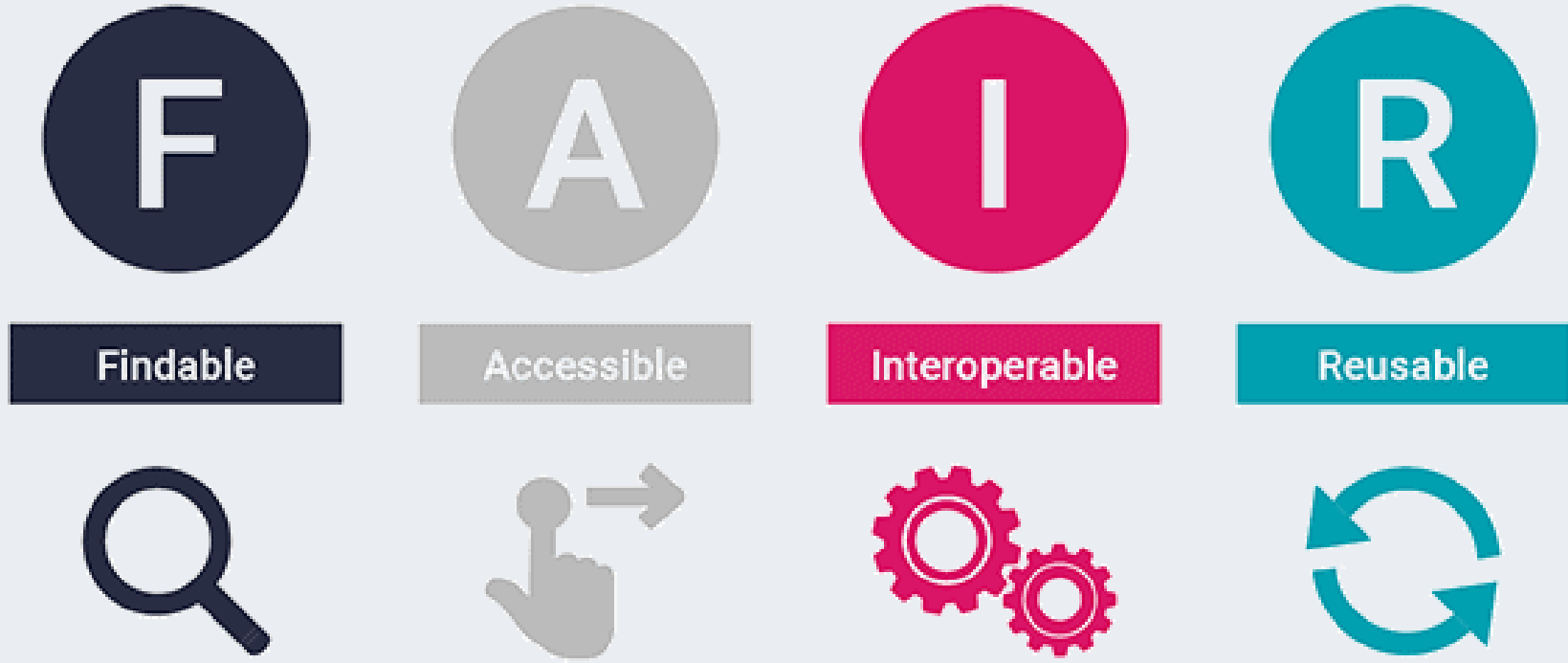
# Research Data Management

- Collection plans
- Storage
- Retention



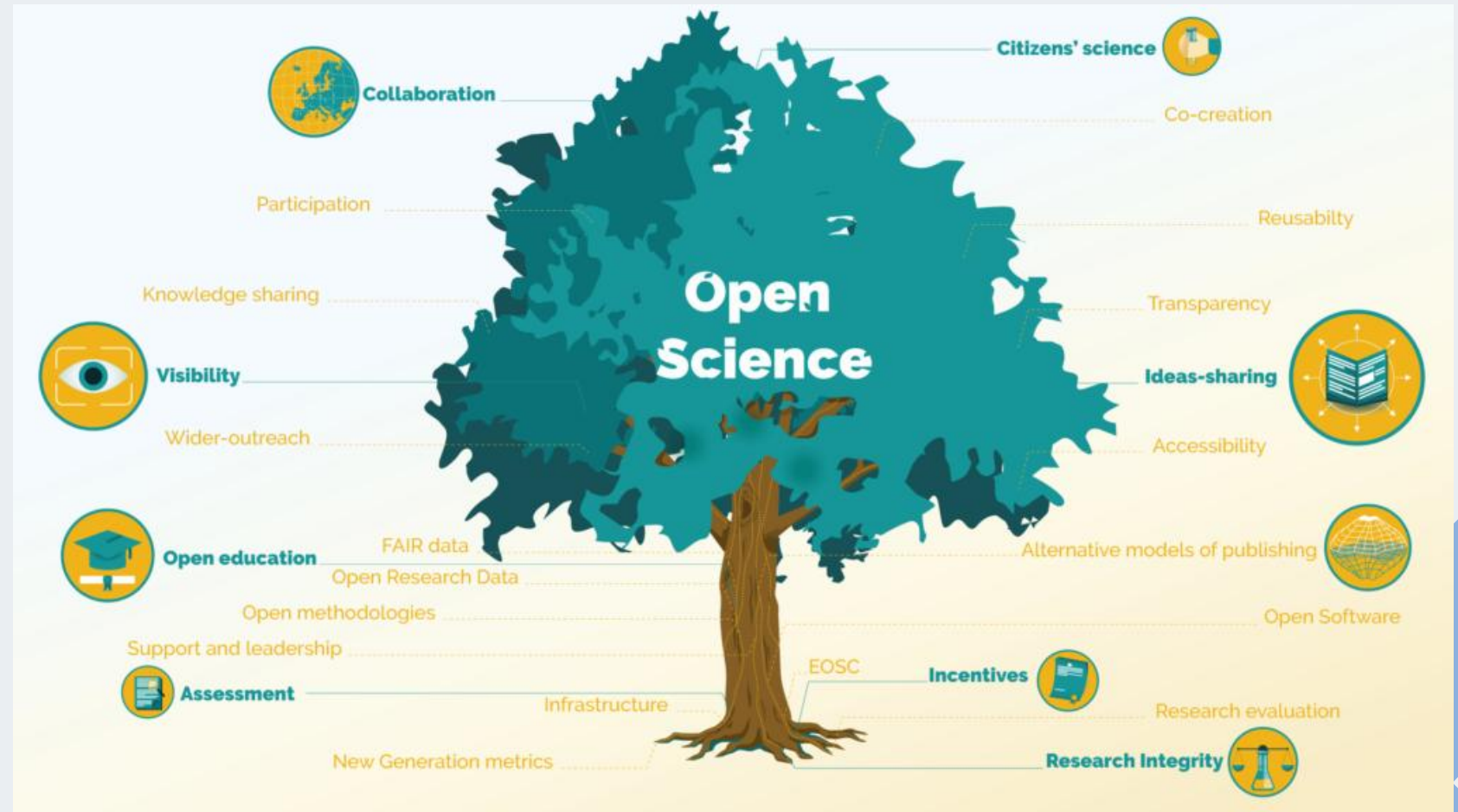
# FAIR Data Principles

- Findable
- Accessible
- Interoperable
- Reusable



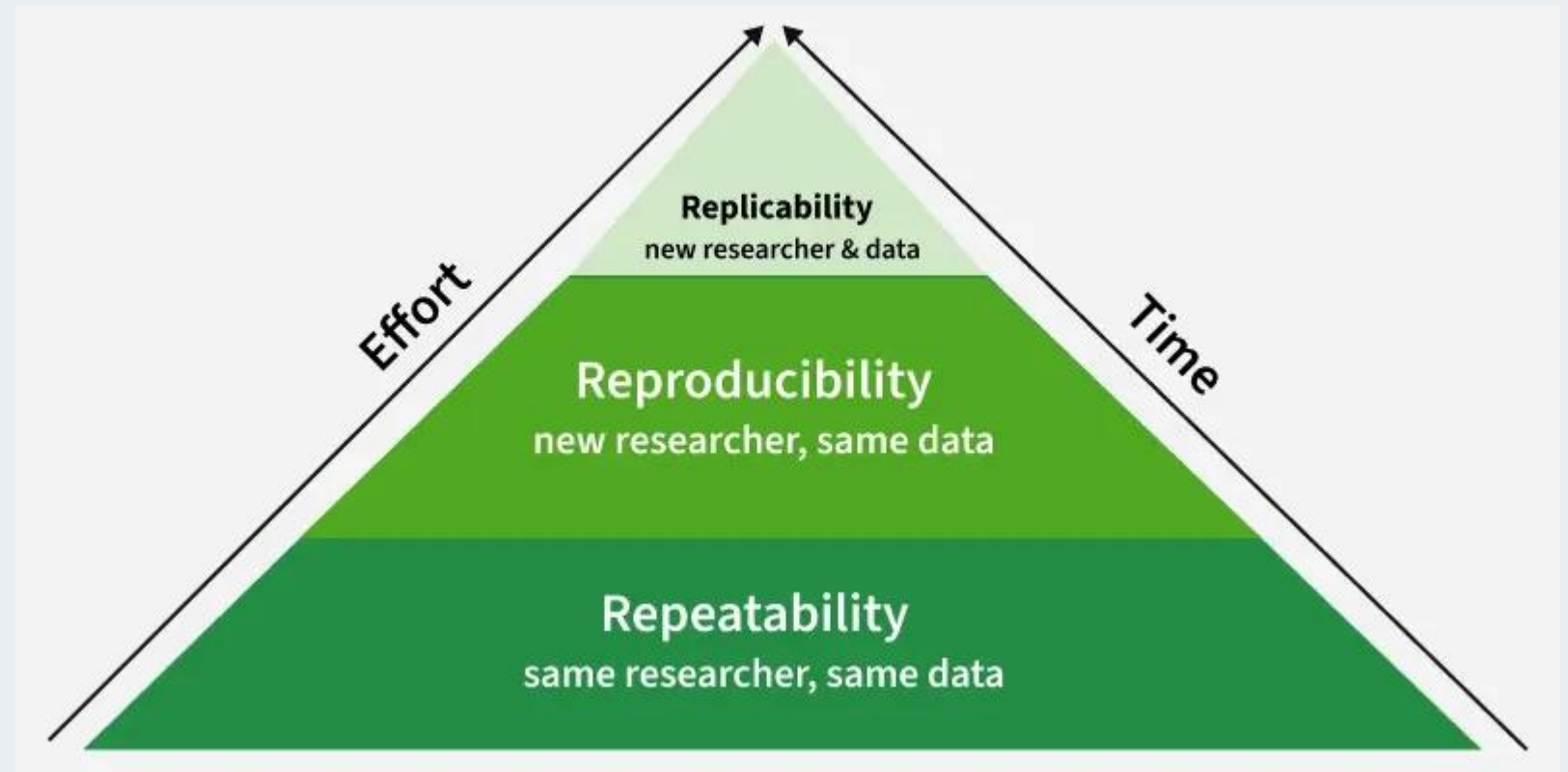
# Open Science

- Open publications
- Open data
- Transparency



# Reproducibility

- Repeatable methods
- Documentation
- Code sharing



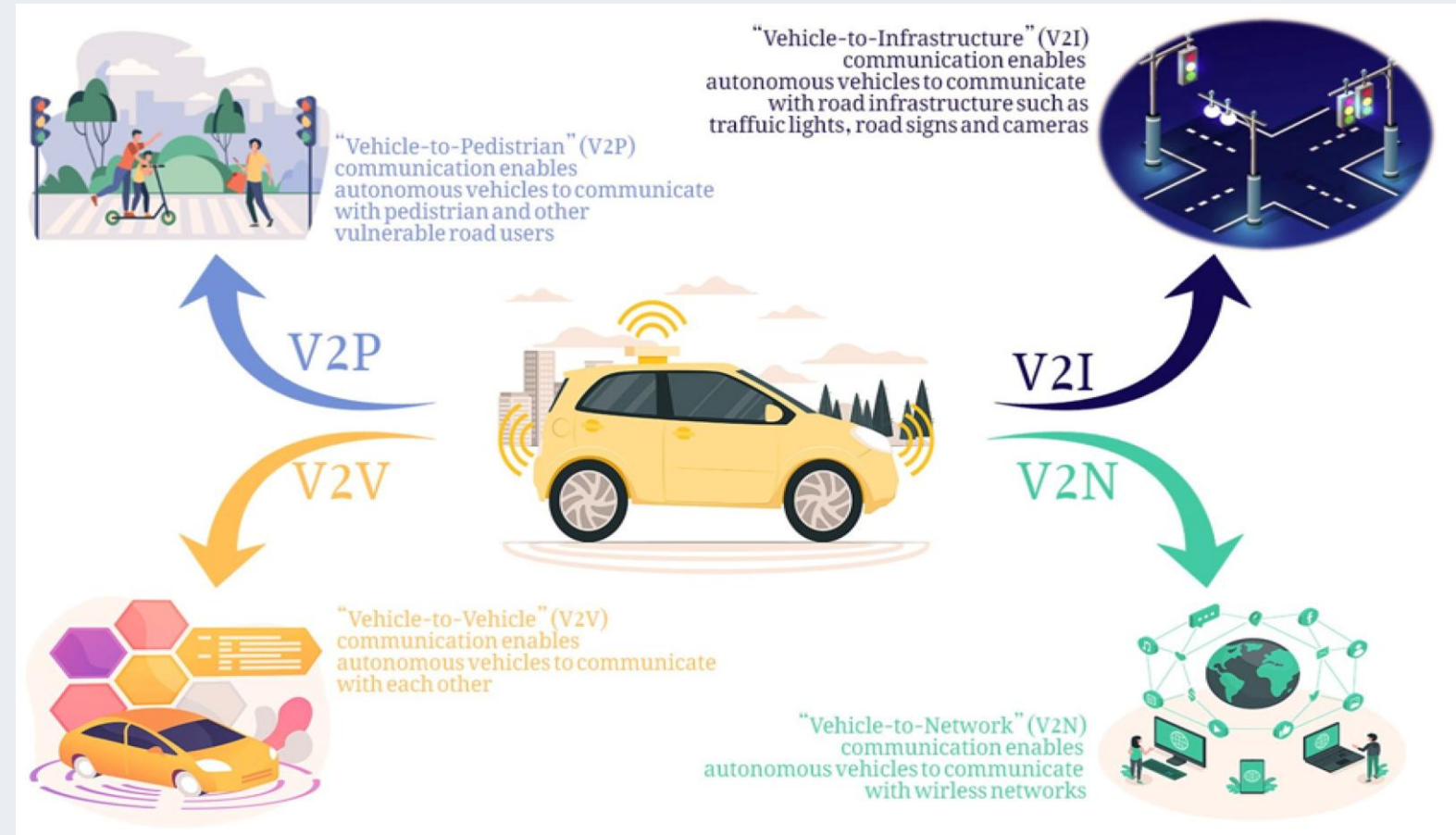
# Hazard Identification

- Physical hazards
- Electrical hazards
- Chemical hazards



# Engineering Ethics Case Study 1

- Autonomous systems failure
- Ethical responsibility



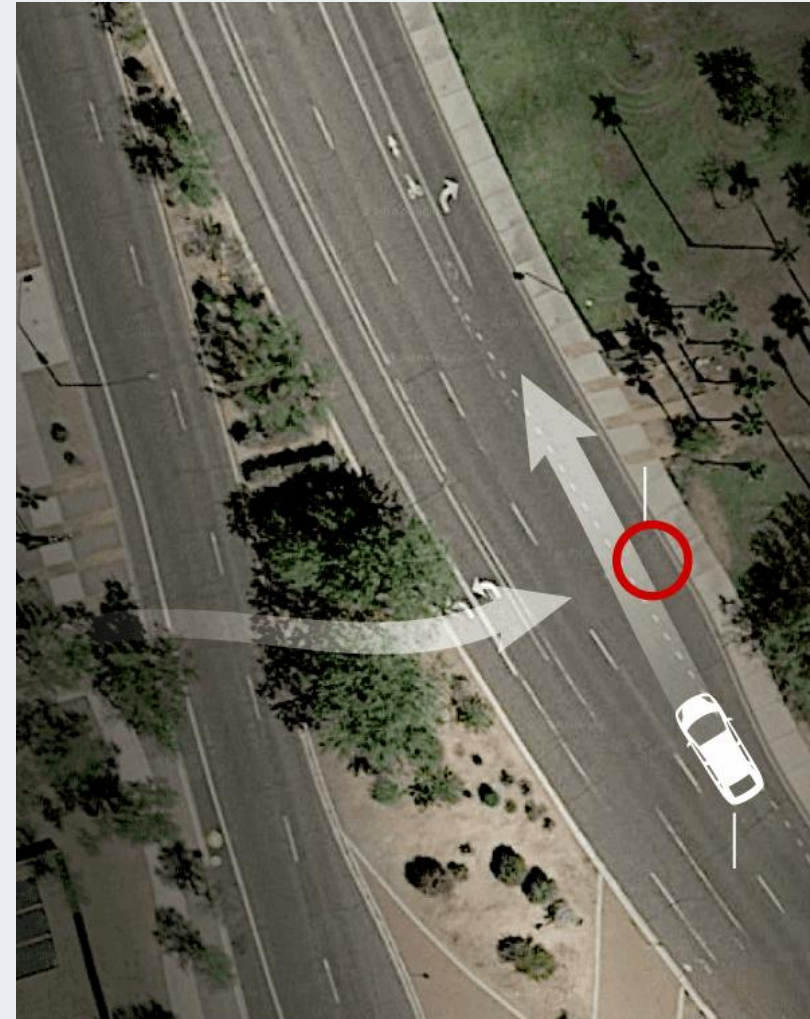
# Case Study 1 - Executive Summary & The Incident

- **The Event:** March 2018, Tempe, AZ. An autonomous Uber test vehicle kills a pedestrian.
- **The Impact:** First pedestrian death by an AV; Uber halted all testing, settled out of court, and eventually sold its ATG division.
- **The Core Dilemma:** Balancing aggressive innovation timelines against public safety margins.



# Case Study 1 - The Engineering Choices (Root Cause Analysis)

- **Software Blindspot:** The system lacked the data to classify a pedestrian wheeling a bicycle outside of a crosswalk.
- **The 1-Second Lag:** Engineers programmed a 1.2-second suppression delay to prevent "phantom braking" (sudden stops for harmless debris).
- **The Critical Flaw:** In a bid to make the ride smooth, engineers actively programmed the car to delay its own emergency response.



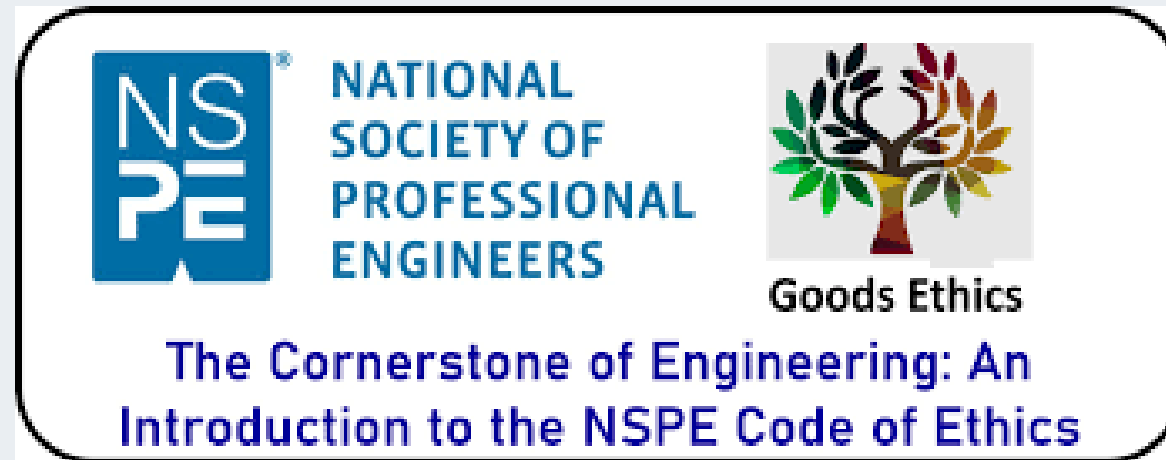
## Case Study 1 - The Organizational Failure (Safety Culture)

- **Systemic De-scoping:** Uber disabled the vehicle's built-in Volvo crash-avoidance systems to prevent software conflicts.
- **Delegating Risk:** Management placed the entire safety burden on a single, low-wage safety driver.
- **Systemic Blindness:** The National Transportation Safety Board (NTSB) later ruled that Uber lacked an independent safety management system (SMS).



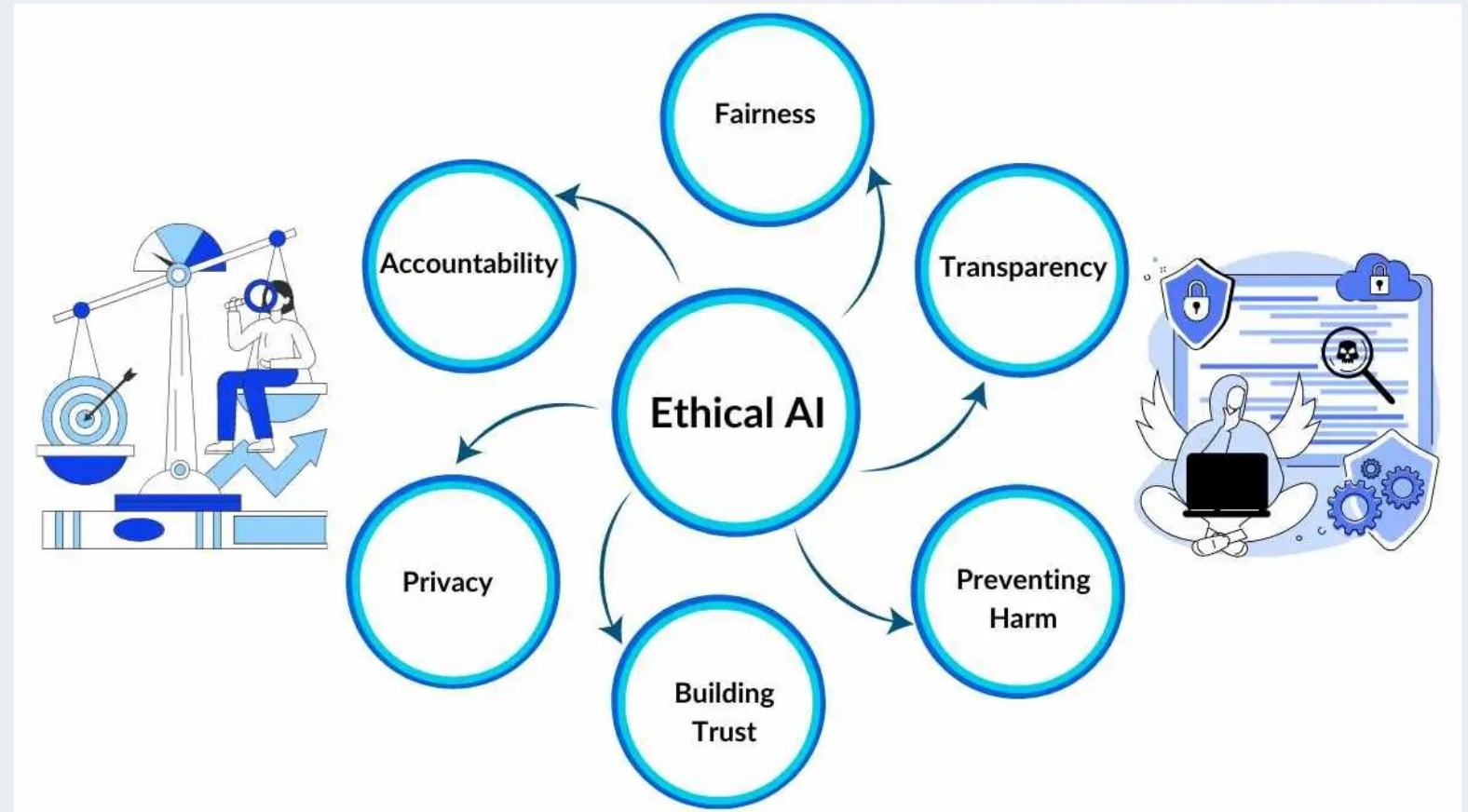
# Ethical Framework: "The Problem of Many Hands"

- **Distributed Responsibility:** When dozens of engineers write fragments of code, who owns the fatal bug?
- **NSPE Code of Ethics Violation:** Engineers failed to hold paramount the safety, health, and welfare of the public.
- **The Takeaway:** Deferring safety to a manager's timeline or a teammate's module does not absolve individual professional liability.



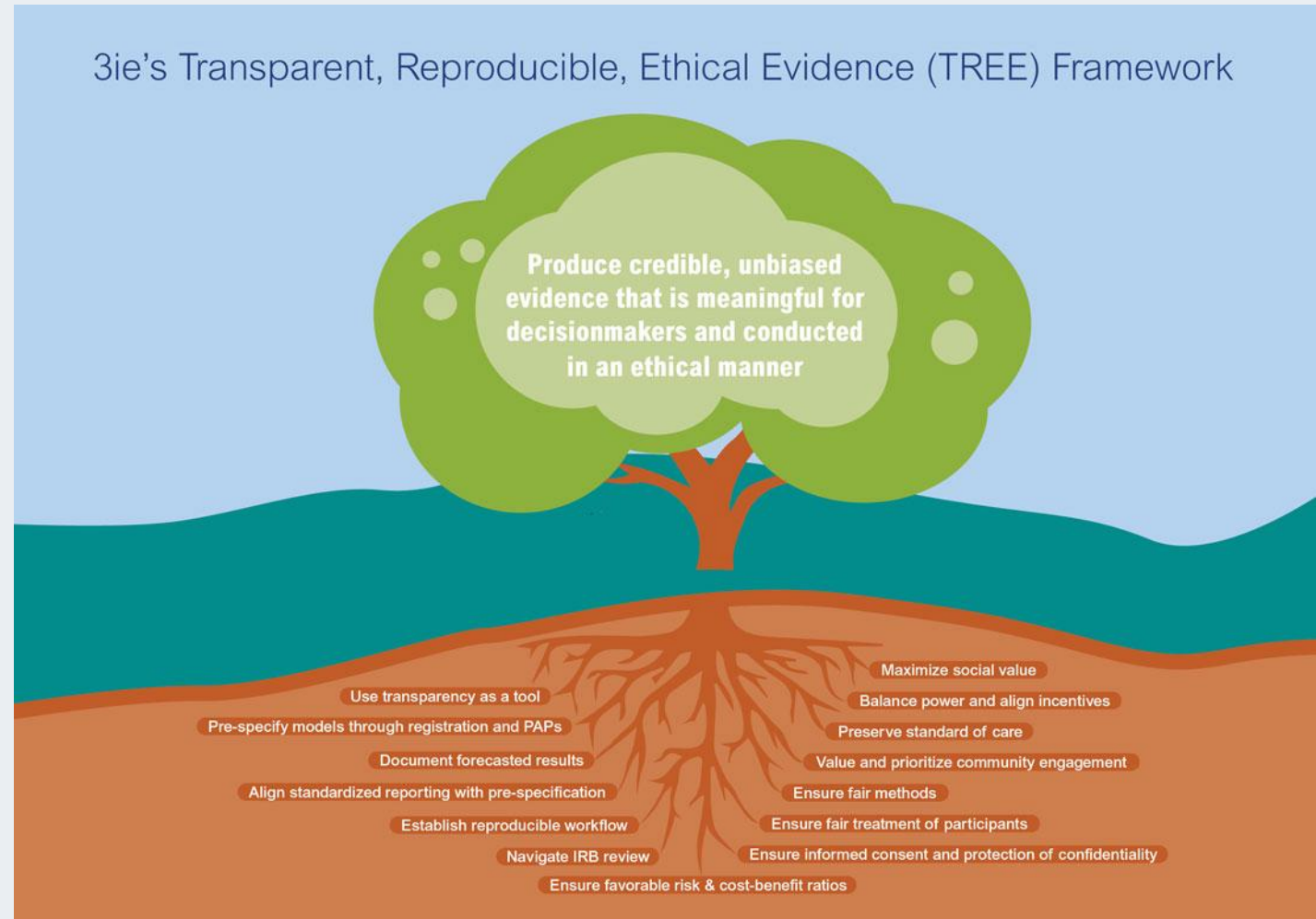
# Engineering Ethics Case Study 2

- AI bias example
- Design decisions



# Ethical Decision Framework

- Identify issue
- Analyse impacts
- Evaluate alternatives



# Building Research Reputation

- Integrity
- Professionalism
- Networks



# Key Takeaways

- Ethics matters
- Safety first
- Integrity always



Research



Concept



Evaluation



Evidence



Knowledge



Analysis



Solution



Work Responsibilities



Thinking



Decision Making

# Thank You!

# Upcoming courses



Courses	Start Date
Doctor of Engineering (online) 36 months	20 July 2026
On-Campus – Doctor of Engineering 36 months Perth/Melbourne	27 July 2026

Find MORE courses here: <https://www.eit.edu.au/schedule/>

# Upcoming Doctoral Webinars

All upcoming Doctoral Webinars:

[www.eit.edu.au/news-events/events/](http://www.eit.edu.au/news-events/events/)

**2 July:** Supervisory and Industry Collaboration: Working as a Research Engineer

**6 August:** Managing the DEng: Planning, Time, and Resources

**3 September:** Communicating Engineering Research: Writing and Presenting Effectively

**1 October:** From Lab to Field: Translating Research into Real-World Engineering Applications

**5 November:** Resilience, Reflection, and the Doctoral Mindset

**3 December:** Building Your Research Identity: Patents, Publications, and Professional Pathways

# Q&A

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[webinars@eit.edu.au](mailto:webinars@eit.edu.au)



**Head Office**  
6 & 8 Thelma Street, West Perth  
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**Phone**  
Inside Australia: 1300 138 522  
Outside Australia: +61 8 9321 1702