

Phase 3: Completion and Impact (Delivering and Beyond) From Lab to Field: Translating Research into Real-World Engineering Applications

[Watch Webinar Recording Here](#)

1 October 2026

Presenter: Emeritus Professor Akhtar Kalam
EIT EMERITUS PROFESSOR



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.



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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 56 postgraduate research students to graduation, including 38 PhD's, 5 DEng and 13 MEngs. Currently, 7 postgraduate research students (4 PhD students at VU and 3 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

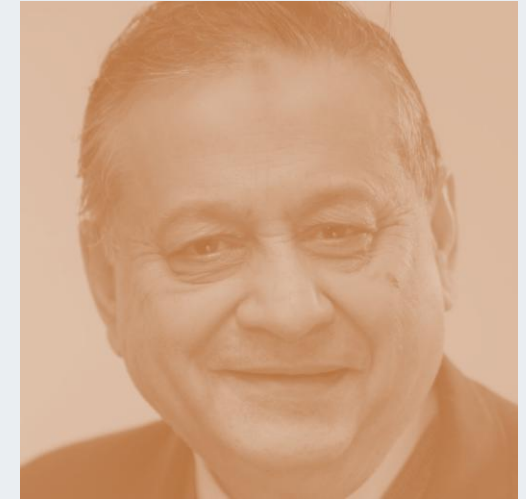
Professional Society Activities

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

1.	PART I — WHY TRANSLATION MATTERS?
2.	PART II — WHAT DOES TRANSLATION MEAN?
3.	PART III — THE RESEARCH ICEBERG
4.	PART IV — THE ENGINEERING TRANSLATION PROCESS
5.	PART V — FROM LABORATORY TO FIELD
6.	PART VI — WHAT MAKES TRANSLATION SUCCESSFUL?
7.	PART VII — IP, STANDARDS, ETHICS AND REGULATION
8.	PART VIII — FUNDING AND THE TRANSLATION ECOSYSTEM
9.	PART IX — TOOLS FOR TRANSLATIONAL RESEARCH
10	PART X — CASE STUDIES
11	PART XI — YOUR DENG AND REAL-WORLD IMPACT



Translating Research into Real-World Engineering Applications

A journey from:

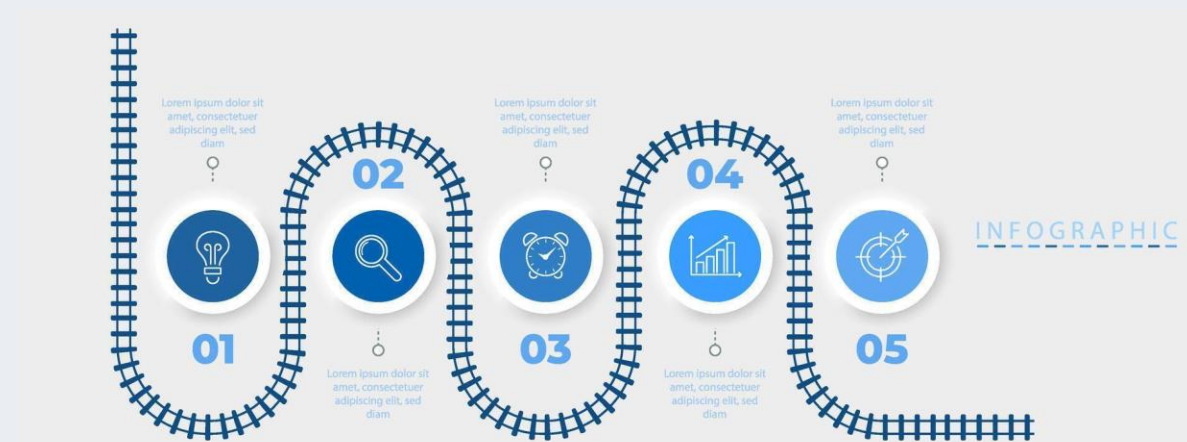
- Discovery
- Research
- Validation
- Prototyping
- Field deployment
- Real-world impact



PART I — WHY TRANSLATION MATTERS?

Today's Roadmap

1. Why does research translation matter?
2. The research-to-impact journey
3. Crossing the "Valley of Death"
4. From problem identification to prototype
5. Laboratory and field validation
6. Industry collaboration
7. IP, standards and regulation
8. Funding and commercialisation
9. Case studies
10. Your opportunity as a doctoral researcher



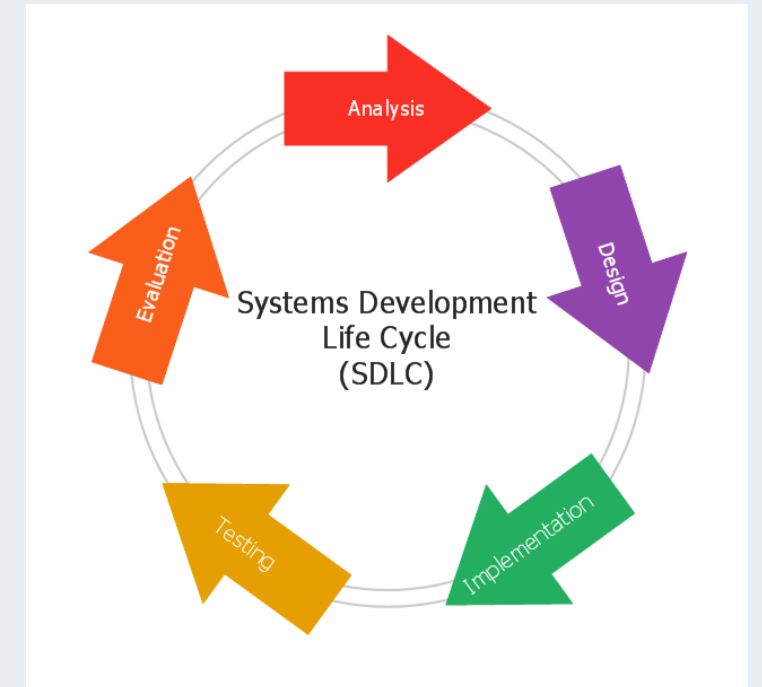
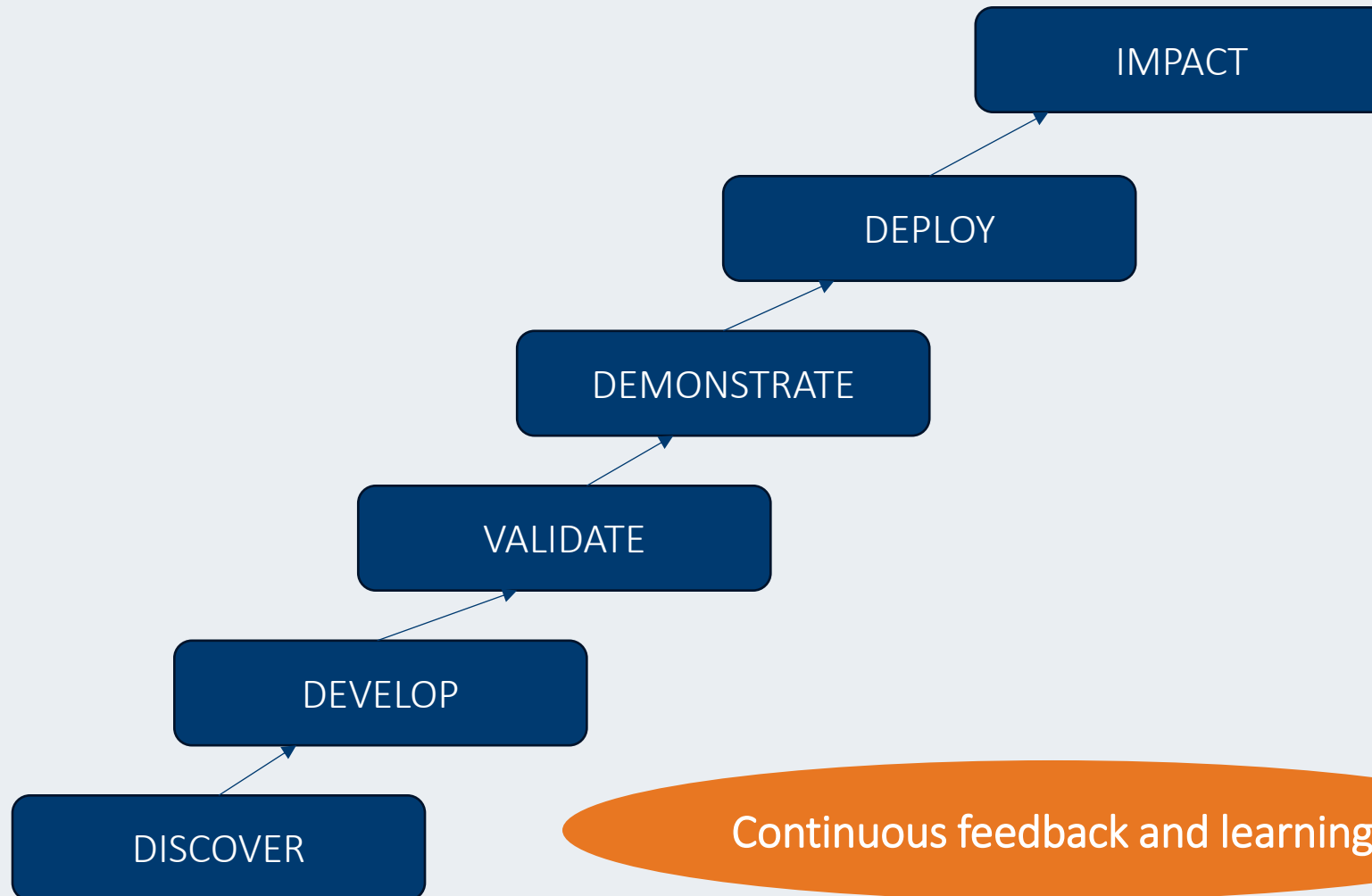
Why Does This Matter?

Engineering research can:

- Improve safety
- Reduce costs
- Increase reliability
- Improve sustainability
- Create new technologies
- Strengthen industries
- Improve quality of life
- Create new businesses
- Influence policy and standards

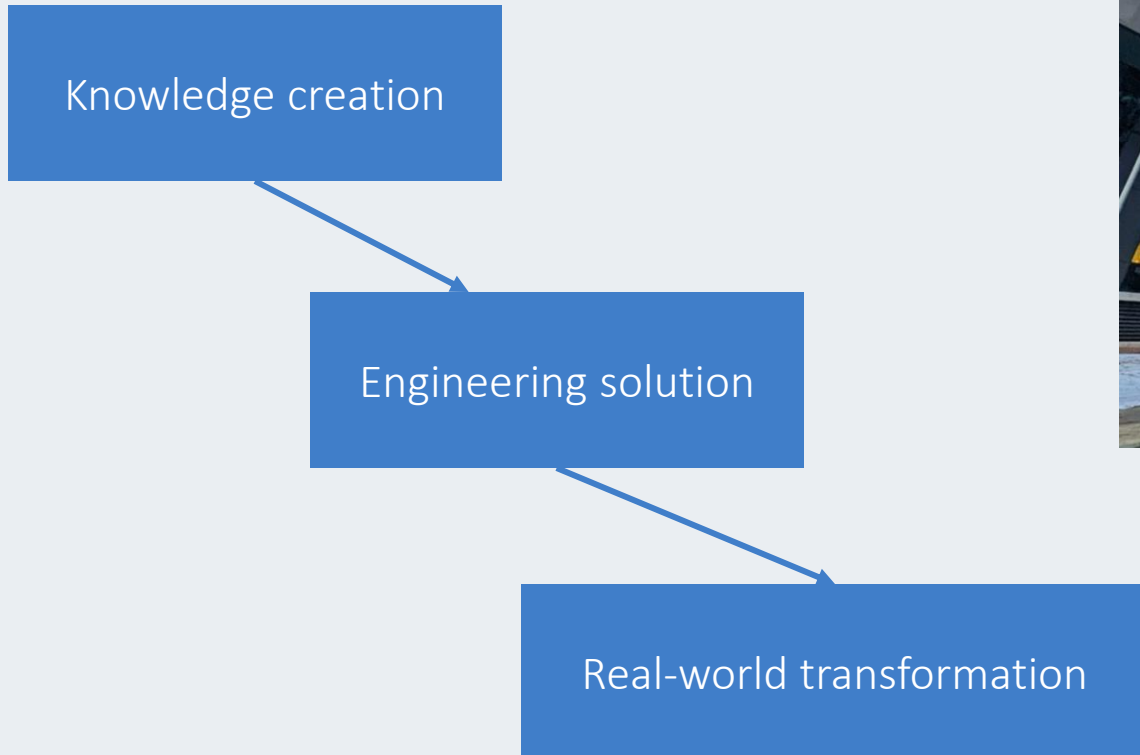


The Research-to-Impact Continuum



From Curiosity to Contribution

DEng research should bridge:



Key question

"Who will benefit if this research succeeds?"

PART II — WHAT DOES TRANSLATION MEAN?

What Is Research Translation?

Research translation = converting research outcomes into solutions that are:

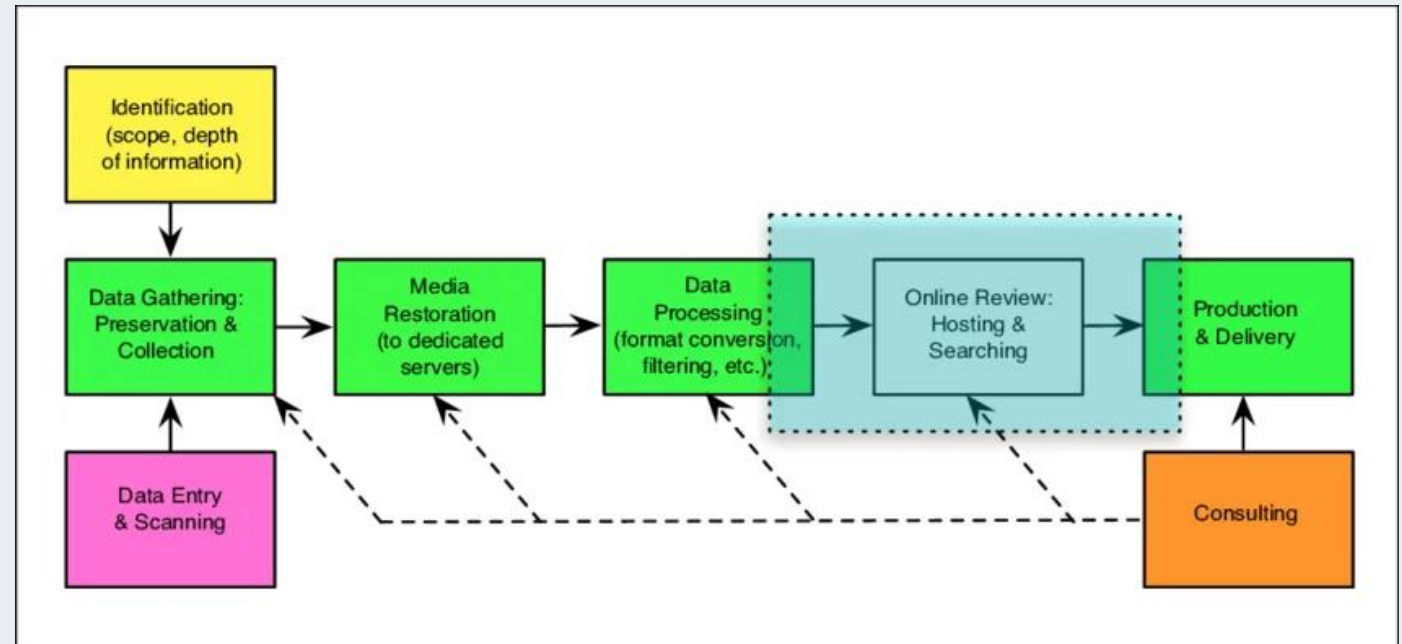
- Usable
- Reliable
- Scalable
- Safe
- Economically viable
- Accessible
- Valuable in real settings



The Translation Journey

Research Idea:

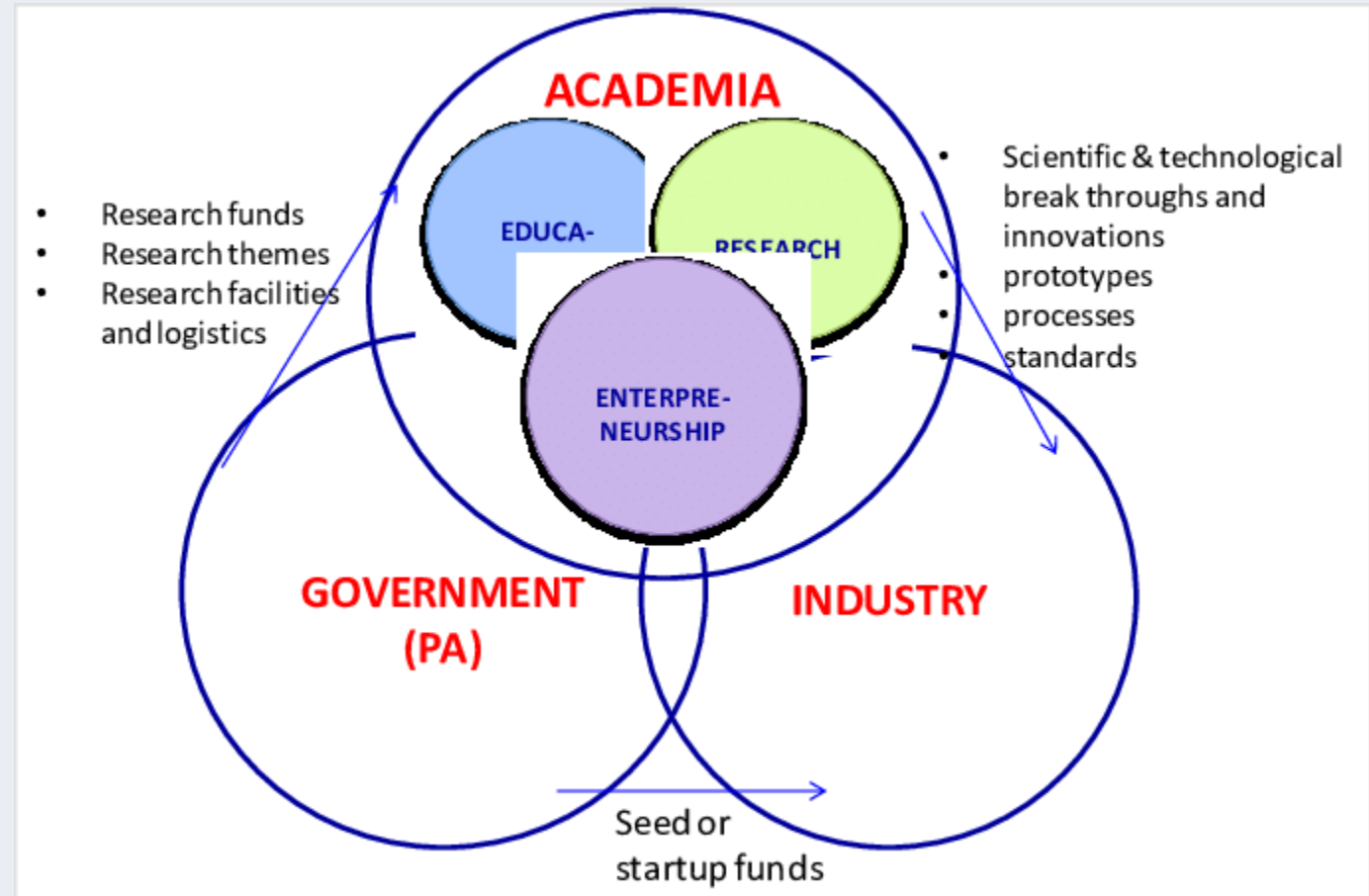
- Proof of Concept
- Prototype
- Laboratory Validation
- Field Trial
- Scale-up
- Deployment
- Impact



Multiple Pathways to Impact

Research can reach society through:

- Industry collaboration
- New products
- Start-ups
- Patents/licensing
- Engineering standards
- Government policy
- Open-source technologies
- Public infrastructure
- Professional practice
- Further research



Examples Across Engineering

Field	Research → Application
Energy	Smart-grid algorithms → grid operation
Civil	New materials → resilient infrastructure
Mechanical	Digital twins → predictive maintenance
Robotics	AI algorithms → autonomous systems
Biomedical	Biomaterials → medical devices
Environmental	Sensors → water monitoring
Manufacturing	AI/robotics → intelligent factories



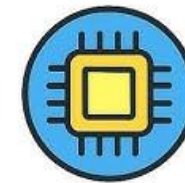
CIVIL



MECHANICAL



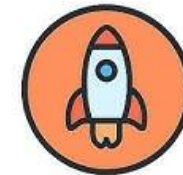
ELECTRICAL



COMPUTER



CHEMICAL



AEROSPACE



BIOMEDICAL



ENVIRONMENTAL



INDUSTRIAL



SOFTWARE

PART III — THE RESEARCH ICEBERG

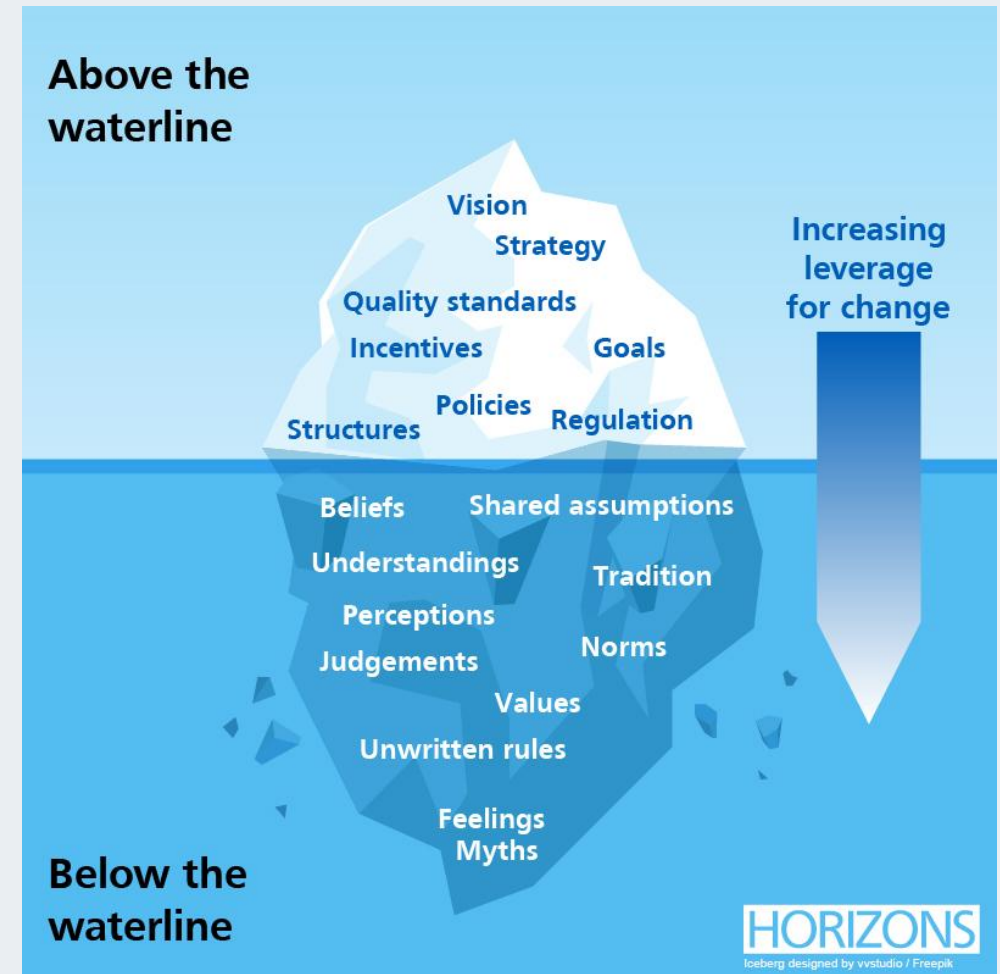
The Research Iceberg

Above the surface

- Publications
- Conferences
- Thesis
- Awards

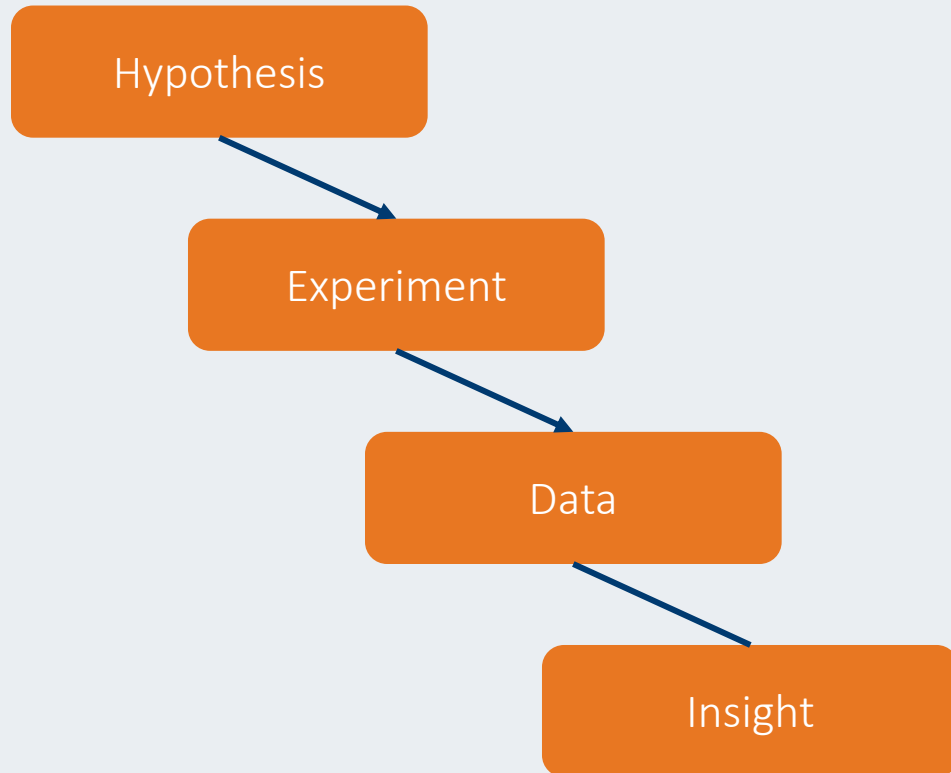
Below the surface

- Failed experiments
- Calibration
- Data cleaning
- Prototype redesign
- Safety
- Reliability
- Stakeholders
- Cost
- Standards
- Regulation
- Manufacturing
- Deployment



From Lab Bench...

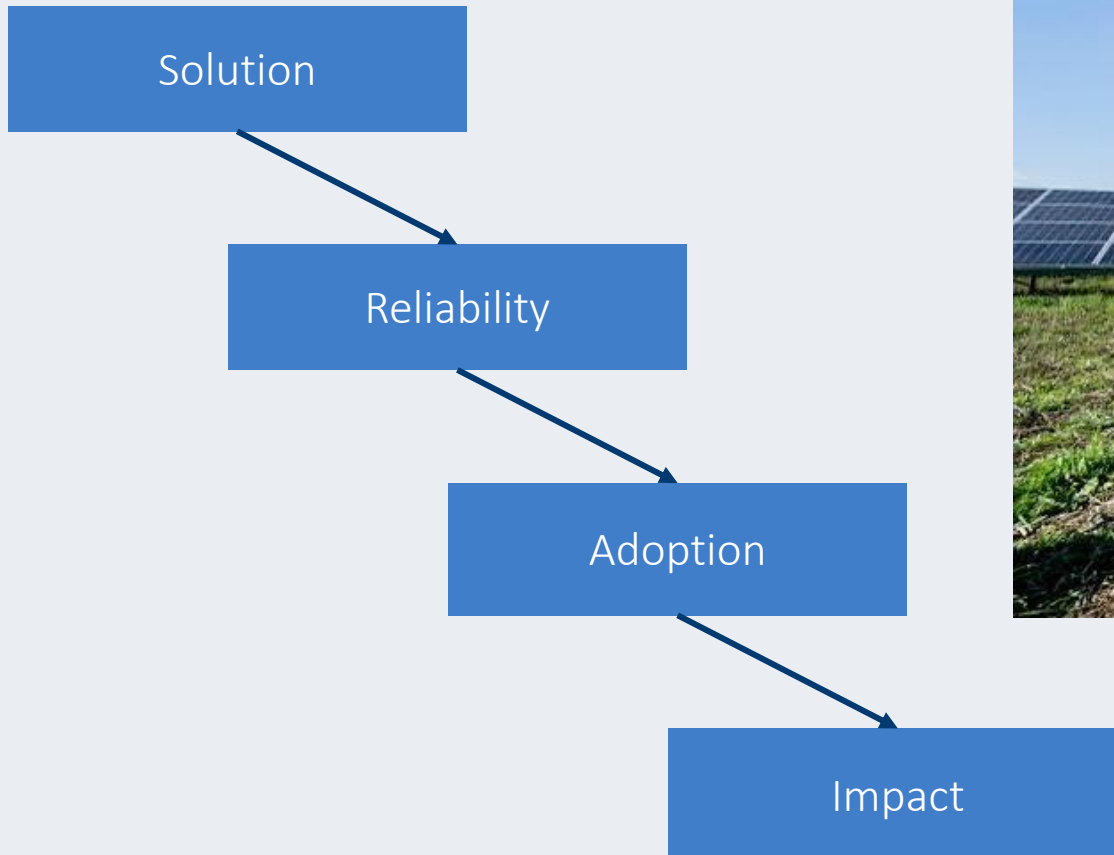
Laboratory



Knowledge creation

...to Field Impact

Real world



Value creation

The "Valley of Death"

Why do promising technologies fail to reach deployment?

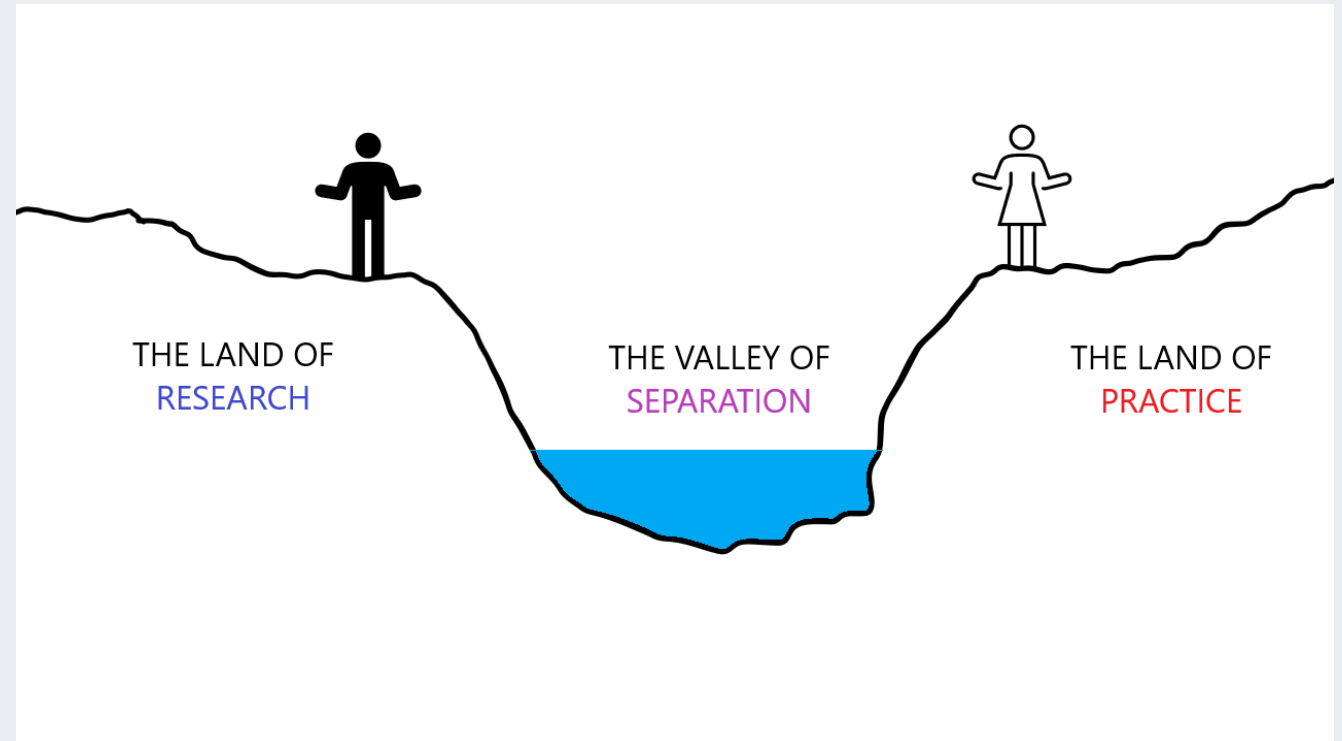
Research

———— **GAP** ————

Market / Society

Common causes:

- Technology uncertainty
- Funding gap
- Lack of industrial partner
- Poor scalability
- Regulation
- Manufacturing difficulty
- Weak business case



Bridging the Gap

Successful translation requires:

Technology
+
Validation
+
People
+
Partners
+
Funding
+
Infrastructure
+
Regulation
+
Persistence



PART IV — THE ENGINEERING TRANSLATION PROCESS

Step 1: Identify the Right Problem

- Who has the problem?
- How significant is it?
- What causes it?
- What solutions exist?
- What are their limitations?
- What would success look like?



Step 2: Literature + Market Scan

Academic questions

- What has been done?
- What are the knowledge gaps?
- What methodologies exist?

Engineering questions

- What solutions already exist?
- What are industry limitations?
- What technologies are emerging?
- What standards apply?



Step 3: Research and Ideation

Generate concepts based on:

- Scientific principles
- Engineering constraints
- User requirements
- Existing technologies
- Emerging technologies
- Interdisciplinary knowledge



Step 4: Proof of Concept

Question:

"Can it work?"

Demonstrate:

- Core principle
- Technical feasibility
- Key performance parameter
- Initial repeatability

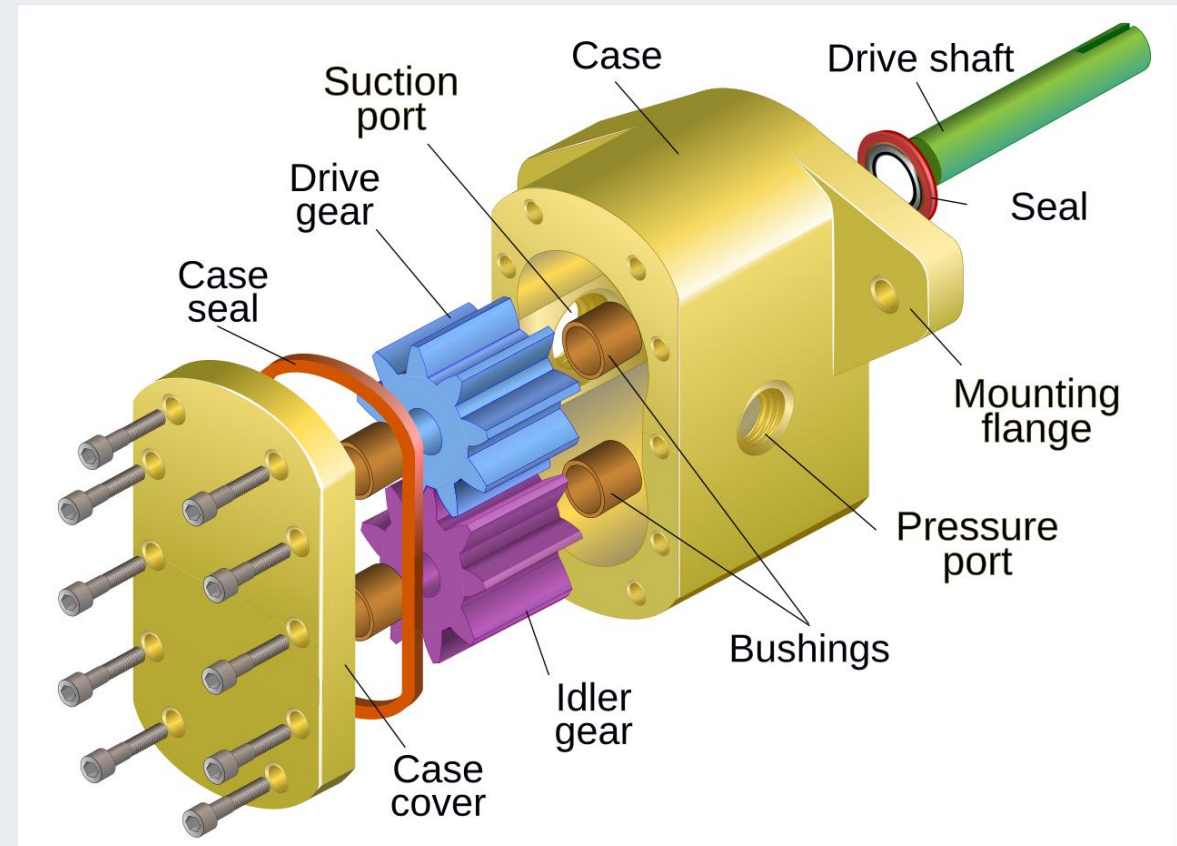


Step 5: Prototype Development

From concept → working system

Consider:

- Hardware
- Software
- Interfaces
- Packaging
- Safety
- Manufacturability
- Maintainability
- Cost



Step 6: Laboratory Validation

Test:

- Performance
- Accuracy
- Reliability
- Repeatability
- Robustness
- Failure modes
- Boundary conditions



PART V — FROM LABORATORY TO FIELD

Step 7: Field Trials

The real-world test

Evaluate under:

- Real operating conditions
- Real users
- Environmental variation
- Existing infrastructure
- Uncertainty
- Unexpected events

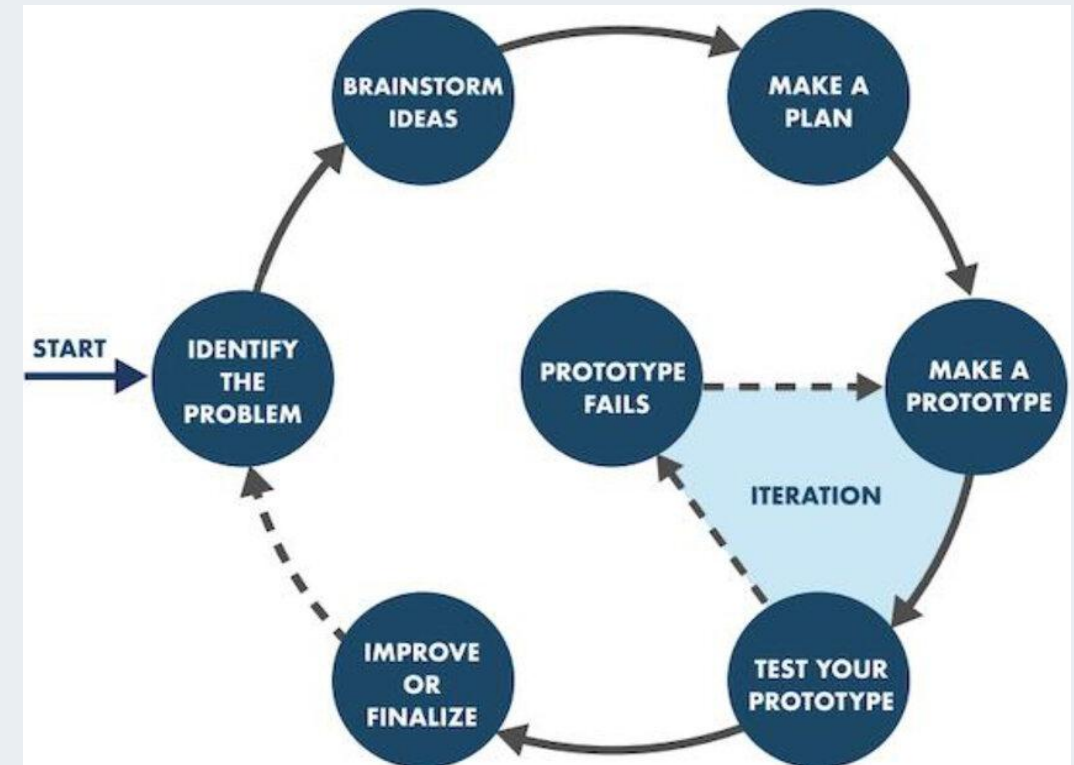


Step 8: Iteration and Improvement



Use:

- Field data
- User feedback
- Failure analysis
- Performance metrics
- Root-cause analysis



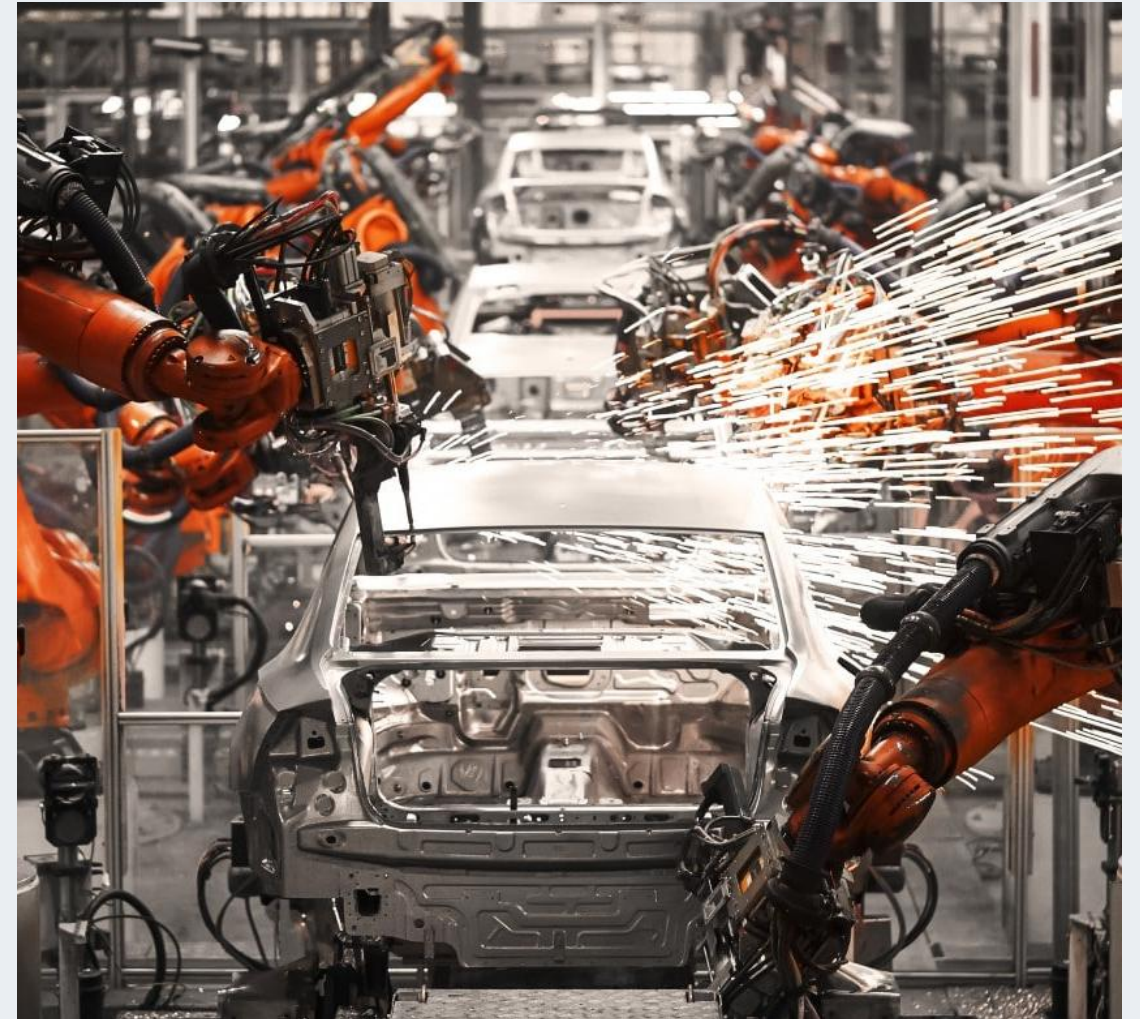
Step 9: Scale-up

From one
prototype

many systems

Consider:

- Manufacturing
- Supply chain
- Cost
- Quality control
- Interoperability
- Installation
- Maintenance
- Cybersecurity



Step 10: Deployment and Adoption

Technology succeeds when people can:

Install it

Operate it

Trust it

Maintain it

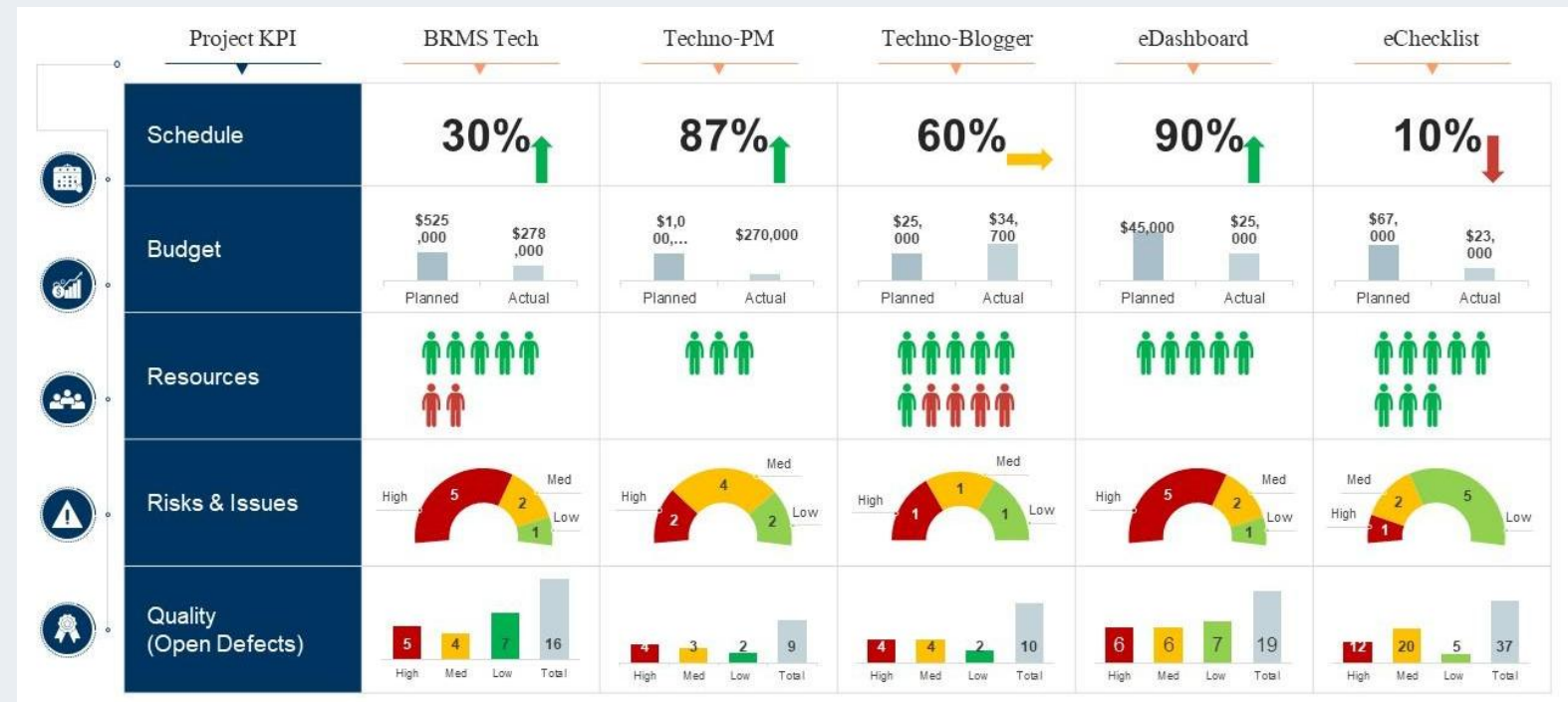
Afford it



Step 11: Measure Impact

Measure:

- Technical performance
- Economic value
- Safety improvement
- Environmental benefit
- Social benefit
- Productivity
- Reliability
- Adoption



PART VI — WHAT MAKES TRANSLATION SUCCESSFUL?

Types of Engineering Impact



Key Success Factors

Successful translation requires:

- Clear problem definition
- Strong scientific foundation
- Engineering discipline
- Industry knowledge
- User involvement
- Interdisciplinary collaboration
- Persistence
- Adaptability



Stakeholders in the Journey

Research ecosystem

Researchers

Industry

Government

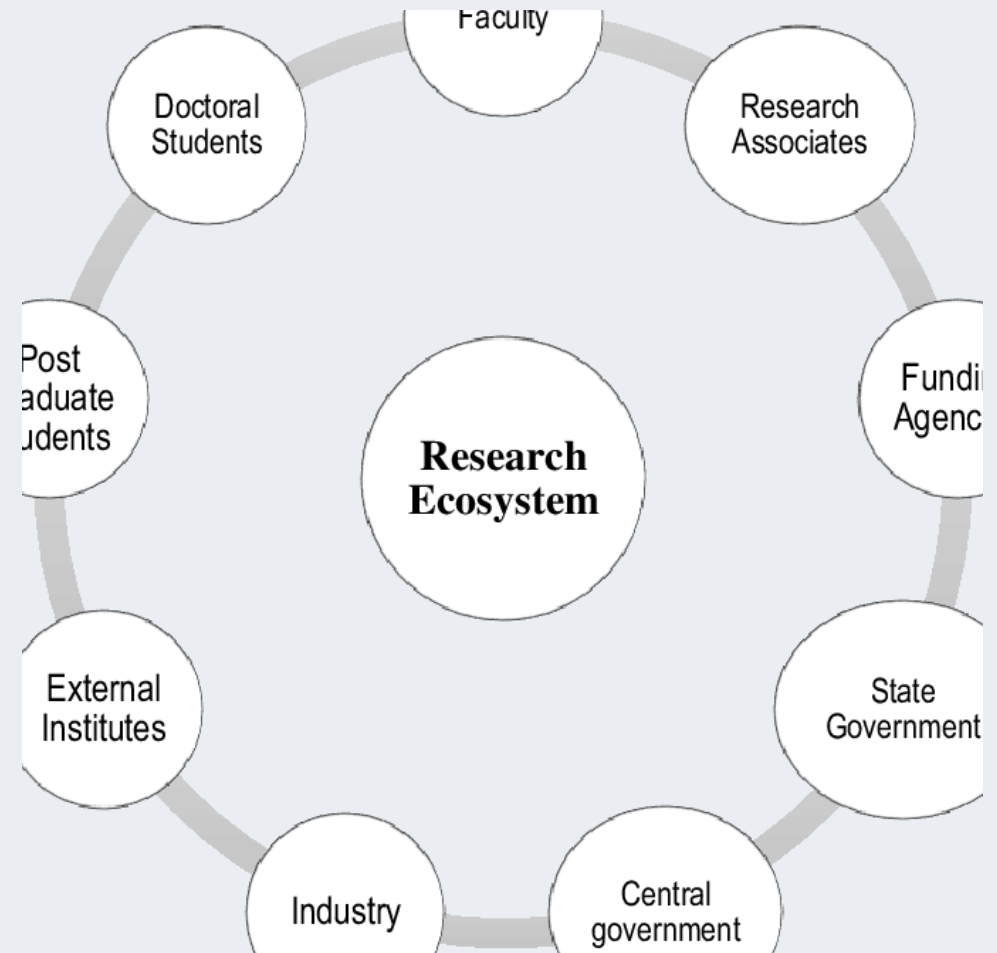
Users

Investors

Communities

Standards bodies

Professional organisations



Industry Collaboration Models

Possible models:

- Sponsored research
- Industry-linked PhD
- Joint development
- Research consortium
- Shared laboratories
- Technology licensing
- Consulting
- Field trials
- Industry advisory panels



The Entrepreneurial Pathway

Research → Innovation → Venture

Possible pathway:

Research discovery

- Prototype
- IP
- Market validation
- Business model
- Start-up
- Investment
- Scale



PART VII — IP, STANDARDS, ETHICS AND REGULATION

Intellectual Property

Before publication, consider:

- Patents
- Copyright
- Software
- Designs
- Trade secrets
- Know-how
- Ownership
- Licensing



Shield
INTELLECTUAL PROPERTY

Standards and Regulation

A technology may fail despite excellent performance if it does not meet:

- Safety requirements
- Technical standards
- Certification requirements
- Cybersecurity requirements
- Environmental regulations
- Industry codes
- Quality requirements

Engineering Project Audit	
Project Documentation	
Verify the availability of project plans, specifications, and design documents.	In Progress
While these documents are all accessible and organized in one centralized database, I'm still confirming with the two project managers if they need to update some details until Monday, October 2.	
To do Assignee: SafetyCulture Staff Priority: Low Due: 07.10.2023 20:46 PST Created by: SafetyCulture Staff	
Follow-up project documentation updates from project managers.	
Confirm that project documentation is up-to-date and includes any revisions or change orders.	In Progress
Ensure that project documentation complies with industry standards and regulatory requirements.	In Progress
Quality Control	
Review quality control measures in place and check for adherence.	Needs Attention
According to the attached report that was recently conducted yesterday morning, some QC measures need to be updated to address newly identified bottlenecks last Wednesday.	
311 Manufacturing Engineering Project - QC Inspection Report.pdf	
Inspect completed work for quality and conformance to specifications.	Needs Attention
Verify the presence of quality control records and inspection reports.	Completed
Safety and Compliance	
Access safety protocols and practices on the project site.	In Progress
Confirm compliance with Environmental, Health, and Safety (EHS) regulations.	In Progress
Review permits and approvals to ensure they are up-to-date and valid.	Completed
Materials and Components	
Inspect materials for compliance with project specifications	In Progress

Ethics in Research Translation

Responsible innovation requires:

- Research integrity
- Data integrity
- Safety
- Privacy
- Security
- Equity
- Transparency
- Accountability
- Long-term societal benefit

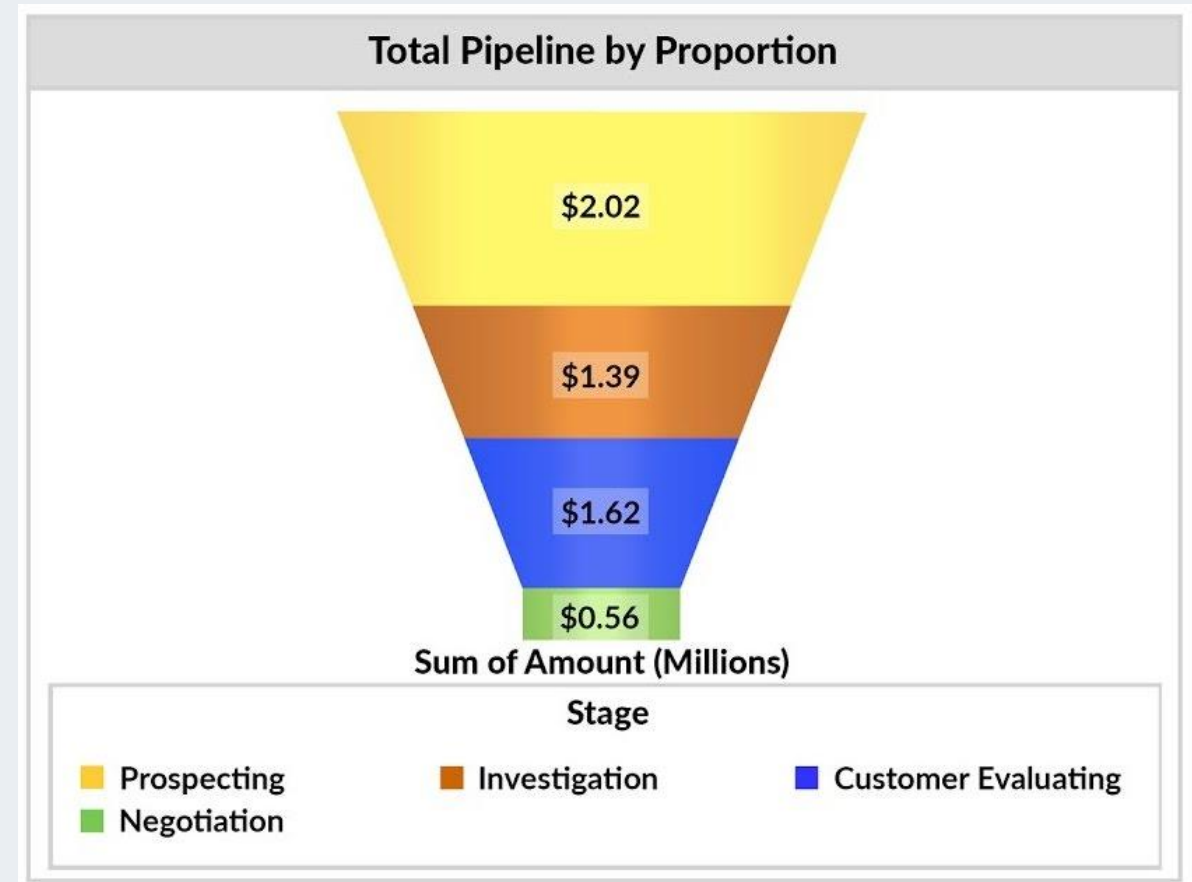


PART VIII — FUNDING AND THE TRANSLATION ECOSYSTEM

Funding Along the Pathway

Different stages may require different funding:

- Discovery
→ University research funding
- Prototype
→ Competitive grants
- Demonstration
→ Industry/government funding
- Commercialisation
→ Investment/venture funding
- Scale
→ Industry capital



Common Challenges

Technical

- Unexpected failure
- Poor robustness
- Scaling problems

Financial

- Funding gaps
- High development cost

Organisational

- Slow decision-making
- Conflicting priorities

Market

- Limited demand
- Competing technologies

Research

- Reproducibility
- Insufficient data



Overcoming the Challenges

Build resilience into your research

- Plan for failure
- Test assumptions early
- Build networks
- Find mentors
- Engage users
- Validate continuously
- Protect IP
- Document lessons
- Celebrate incremental progress



PART IX — TOOLS FOR TRANSLATIONAL RESEARCH

Tools and Resources

Technical tools

- Simulation
- Modelling
- Digital twins
- AI/ML
- CAD
- Prototyping

Experimental

- Testbeds
- Hardware-in-the-loop
- Pilot facilities
- Field instrumentation

Collaboration

- Open datasets
- Research repositories
- Industry platforms
- Shared laboratories



Communicating Your Research

Explain your research to three audiences:

Researcher

"What is scientifically new?"

Engineer

"Does it work?"

Decision-maker

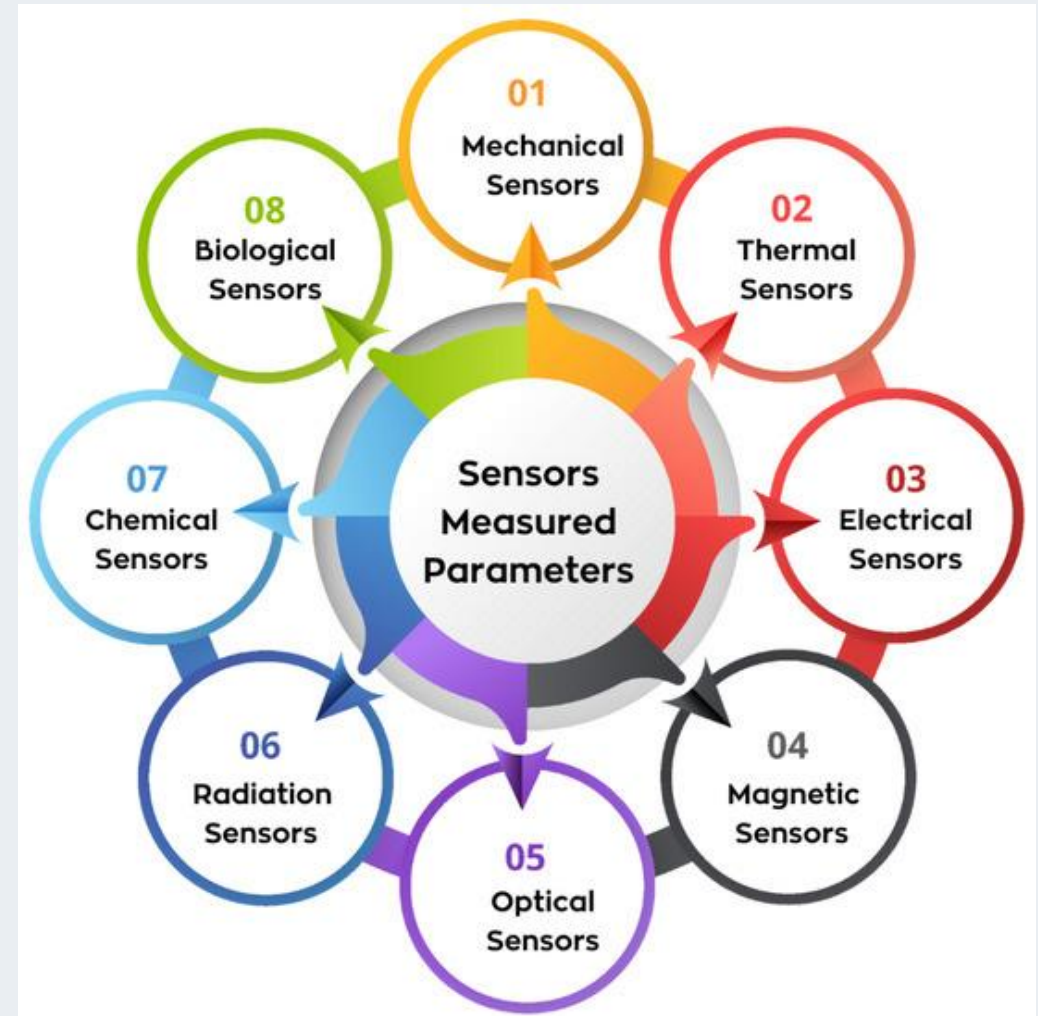
"Why should I care?"



Publishing for Impact

Publication is important—but ask:

- Who will read it?
- Who can use the findings?
- Can others reproduce it?
- Is the data available?
- Are the methods transferable?
- Does it identify practical implications?



PART X — CASE STUDIES

Case Study 1: Advanced Battery Materials

Research

New electrode/material chemistry



Laboratory

Improved energy density



Prototype

Battery cell



Testing

Thermal and cycle-life evaluation



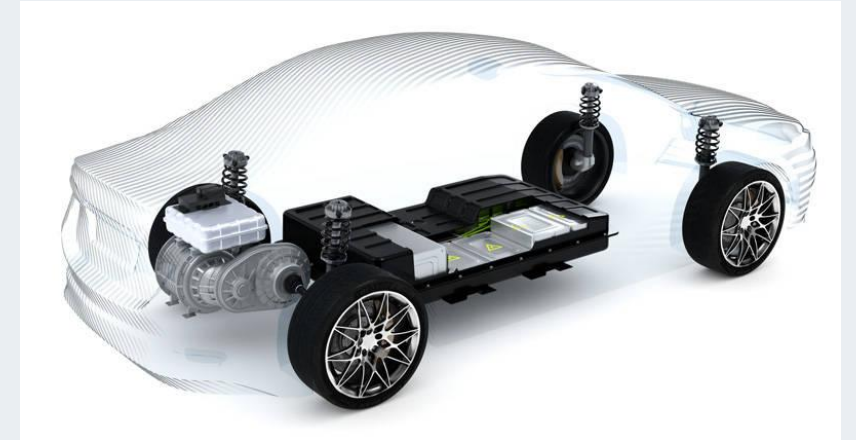
Application

EV battery pack



Field

Vehicle testing



Case Study 2: Smart Water Networks

Research

Intelligent sensing + analytics



Prototype

Low-cost sensor network



Pilot

Municipal water network



Field data

Leak detection

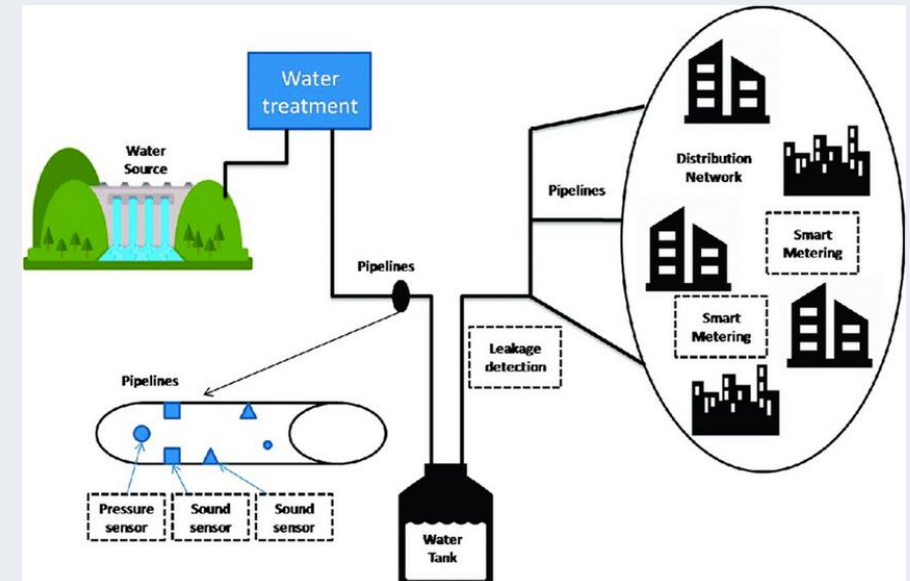


Deployment

City-wide monitoring

Impact

- Reduced water loss
- Faster fault detection
- Better asset management



Case Study 3: Robotics in Agriculture

Research

Computer vision + autonomous navigation



Laboratory

Object recognition



Prototype

Autonomous agricultural robot



Field

Variable terrain, weather and crops



Deployment

Autonomous farm operation

Potential impact

- Reduced labour requirements
- Precision agriculture
- Reduced chemical use
- Increased productivity



PART XI — YOUR DENG AND REAL-WORLD IMPACT

Your DEng Advantage

A doctorate develops:

- Deep expertise
- Research mindset
- Problem-solving ability
- Experimental discipline
- Analytical thinking
- Innovation capability
- Communication
- Collaboration
- Leadership



Your Call to Action

Choose research that matters.

Find a meaningful problem.

Build rigorous knowledge.

Partner with practitioners.

Test beyond the laboratory.

Learn from failure.

Translate your research.

Create measurable impact.

Closing statement

Be the engineer the world needs.



Thank You / Discussion

Thank You

Questions & Discussion

Let's build a better future together.

- INNOVATE
- COLLABORATE
- TRANSLATE
- IMPACT



Thank You!

Q&A



Upcoming courses

Courses	Start Date
Doctor of Engineering (online) 36 months	8 February 2027
On-Campus – Doctor of Engineering 36 months Perth/Melbourne	15 February 2027

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

Upcoming Doctoral Webinars

All upcoming Doctoral Webinars:

www.eit.edu.au/news-events/events/

5 November: Resilience, Reflection, and the Doctoral Mindset

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

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