



[Watch Webinar Recording Here](#)

How To Write Your Research Proposal for Our Doctor of Engineering

11 April 2024 | Information Session Webinar

Presented by:

Dr. Vishal Sharma, DEng Coordinator

Dr. Arti Siddhpura , DEng Deputy Coordinator

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.



Industry Oriented Programs

Our programs are designed by industry experts, ensuring you graduate with cutting-edge skills that are valued by employers. Our program content remains current with rapidly changing technology and industry developments.



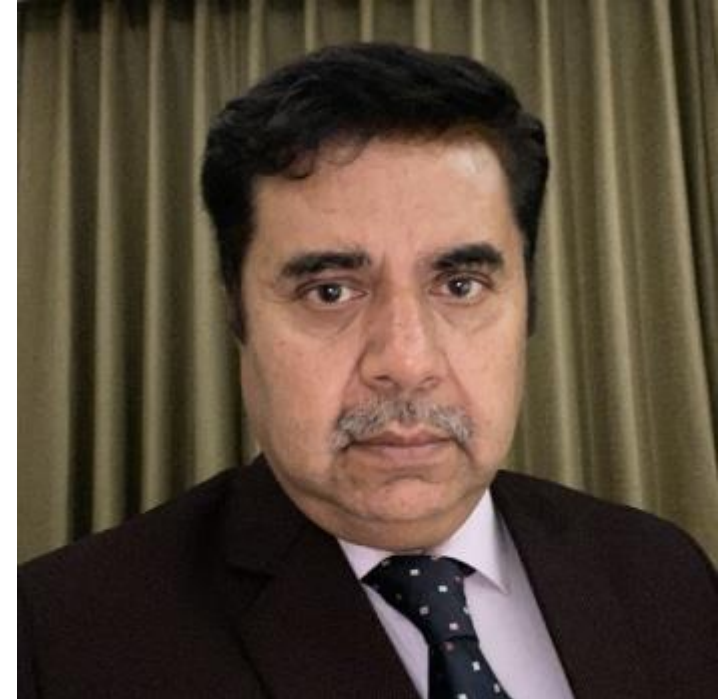
Unique Delivery Model

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.

Introduction - Presenter

Dr. Vishal Sharma - DEng Coordinator

- Vishal Santosh Sharma is an esteemed Senior On-Campus Lecturer and Doctoral Research Coordinator at EIT, specializing in Mechanical Engineering.
- With over 25 years of experience in teaching and research, Vishal has made significant contributions to the field of advanced manufacturing.
- Vishal's research in Advanced Manufacturing has led to the publication of 108 scientific articles with over 3,600 citations, earning him a notable H-index of 34 on Scopus.
- He has demonstrated leadership by organizing seven international conferences, editing special journal issues, and publishing three books with Springer publishers.
- Vishal has successfully supervised thirteen PhD and 28 Masters students, fostering their academic growth, and has served as an Associate Editor for prestigious journals in the field.



Introduction - Presenter

Dr. Arti Siddhpura - DEng Deputy Coordinator

- Dr. Arti is a distinguished academic with over 18 years of experience in educating students in Mechanical Engineering at esteemed institutions in Australia and abroad.
- She excels in crafting and delivering Mechanical Engineering courses at both undergraduate and postgraduate levels, utilizing synchronous and asynchronous teaching methodologies rooted in adult learning theories.
- Dr. Arti's scholarly journey includes a Ph.D. project supported by the prestigious CIEAM scholarship, focusing on stick-slip vibration-based diagnosis and prognosis of cutting tool wear, closely aligned with industry research needs.
- She currently serves as the Recognition of Prior Learning (RPL) coordinator, overseeing the RPL process, ensuring quality assurance, and spearheading the formulation of guidelines and policies.
- Dr. Arti's leadership extends to coordinating Bachelor of Mechanical Engineering (BME), Graduate Certificate in Structural Engineering (GCSR), and as a deputy coordinator of Doctor of Engineering (DEng) courses, ensuring seamless execution of academic programs.



Agenda

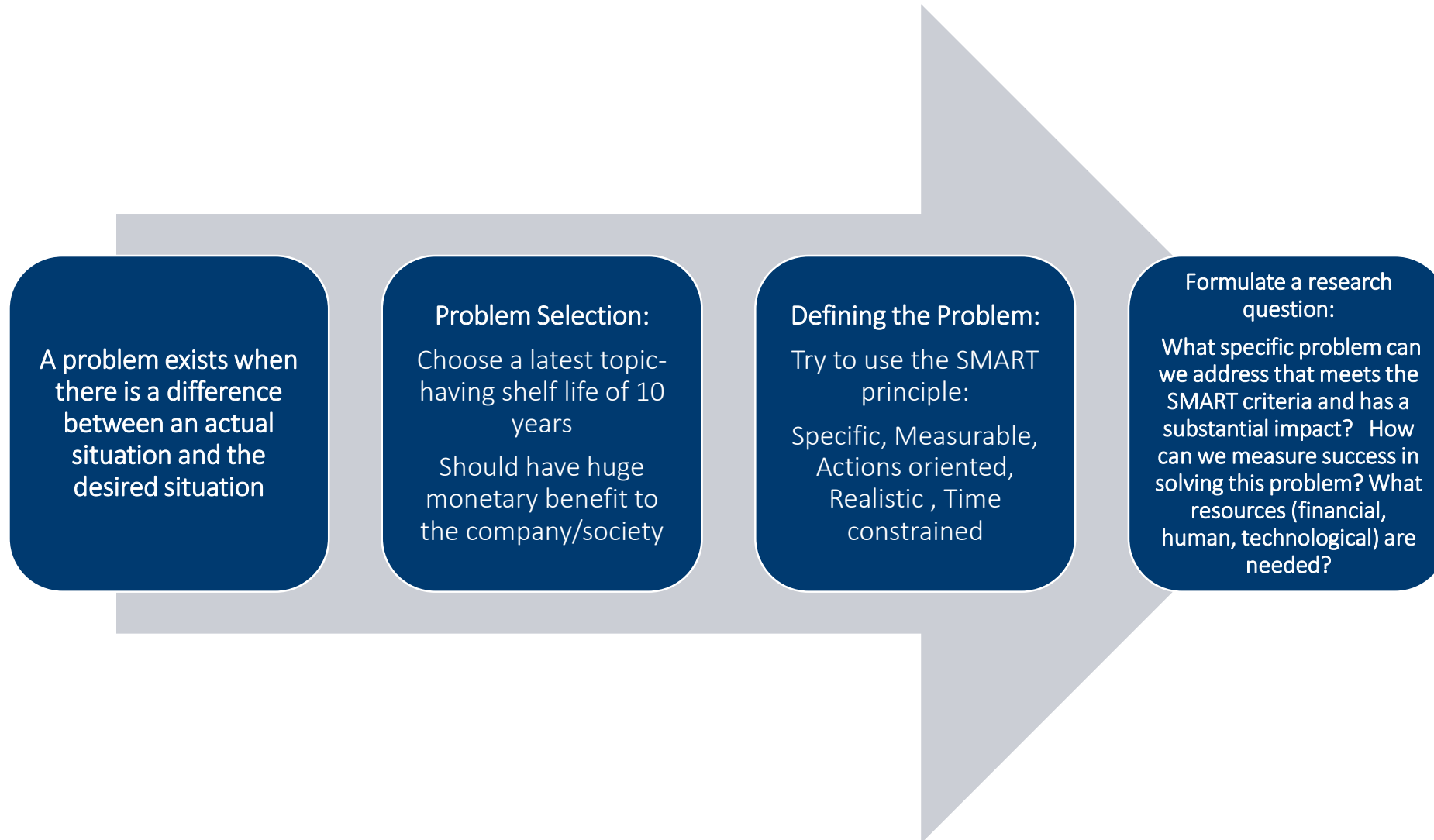
1	Identifying the Research Problem
2	Literature Review Process
3	Steps for Research Design and Methodology
4	Research Timeline and Budget
5	Examples of Research Topics



Research: Difference between PhD & DEng

Aspect	PhD	DEng
Objective	Advancing theoretical knowledge and understanding in a specific field.	Applying advanced research and technical skills to solve complex industry problems.
Focus	Original research contributing new knowledge publishable in peer-reviewed journals.	Practical and applied research impacting engineering practice and technology development.
Research Approach	Hypothesis-driven.	Applied research.
Aim	Prove or disprove theories based on empirical evidence.	Develop practical solutions, often leading to innovation in processes, products, or technology.

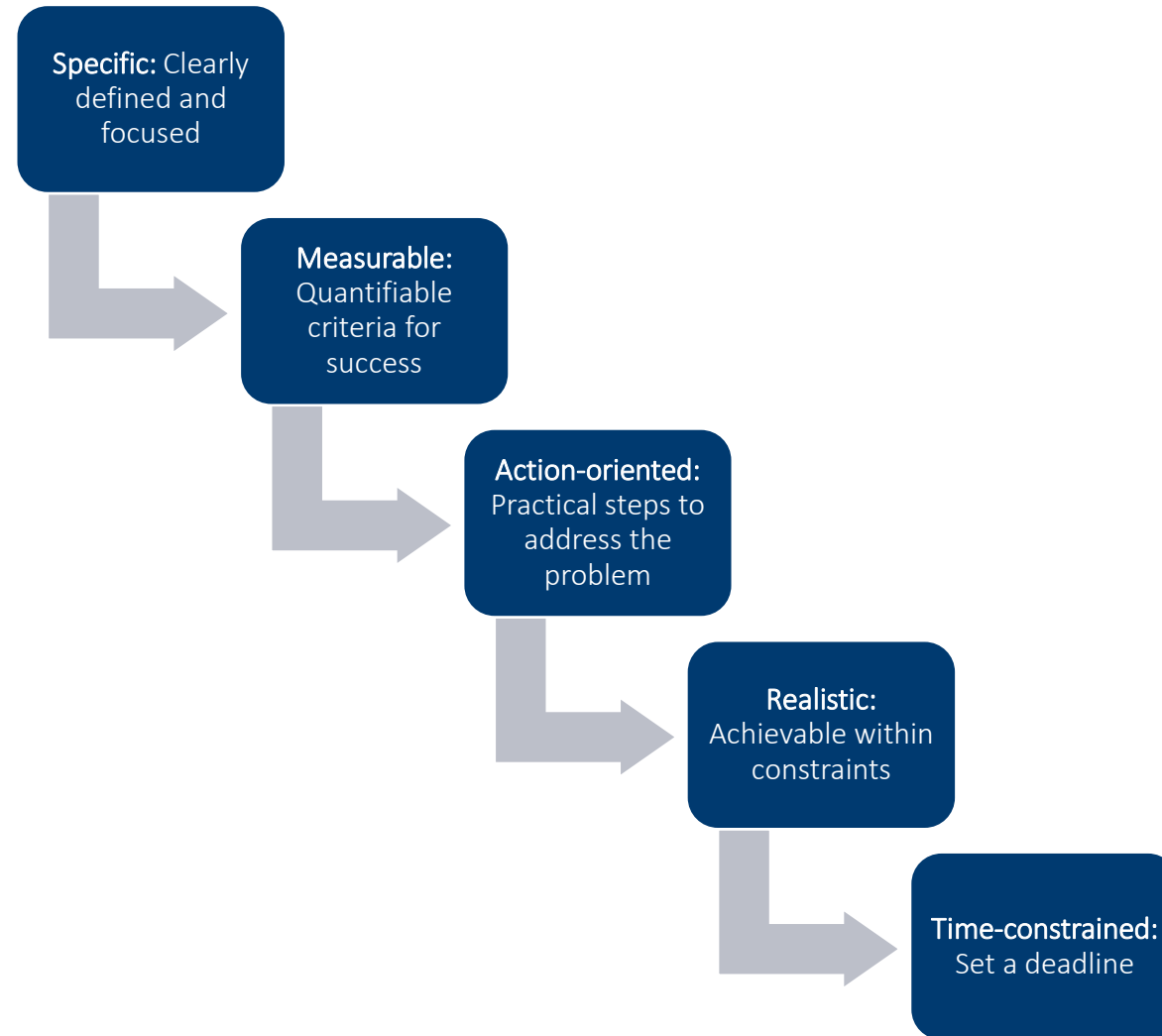
Research Problem



Research Problem

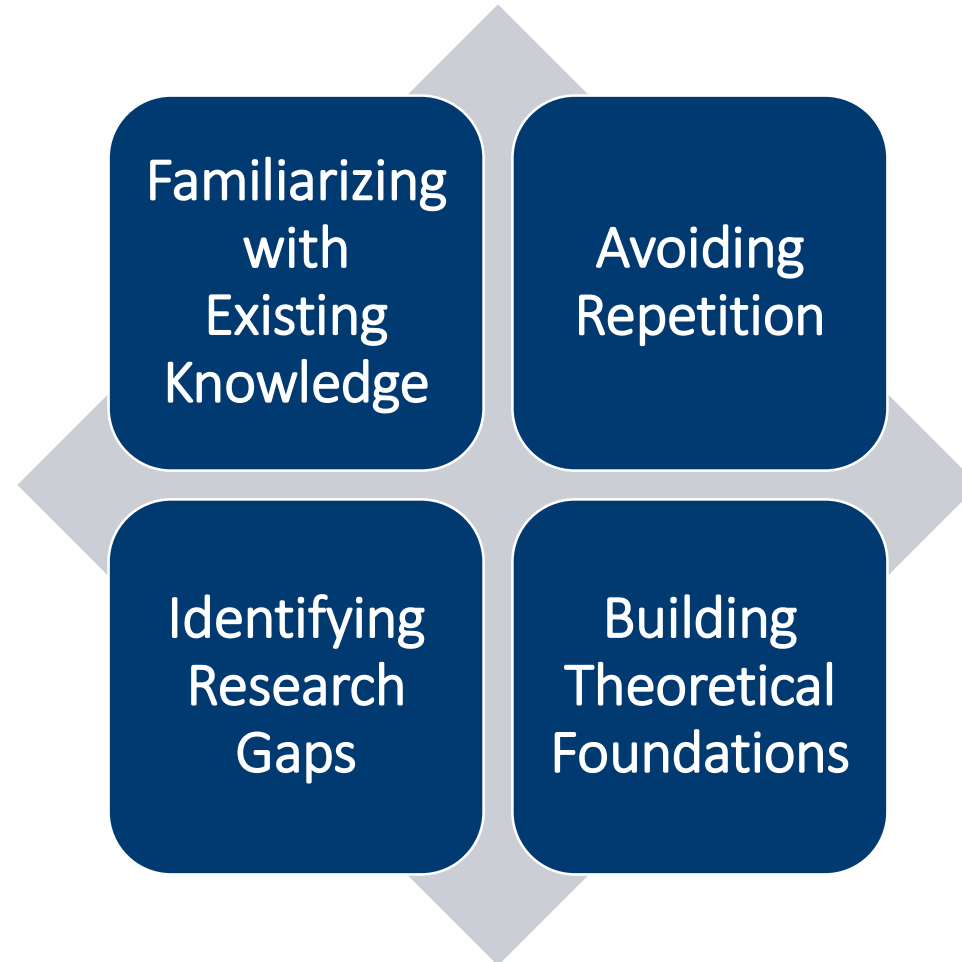
Defining the Problem:

- Use the SMART principle



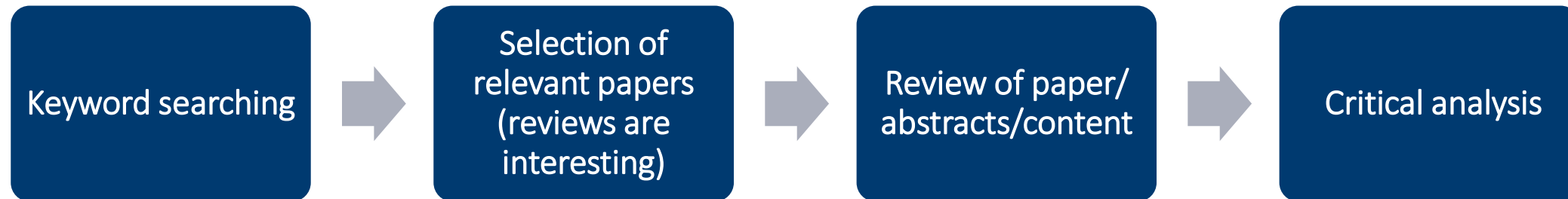
Literature Review

A literature review plays a crucial role in a research proposal.



Literature Review

Literature reviews are mandatory.
Typical sequence:



Literature Review

Where to Start for Literature Review:

<https://scholar.google.com>

<http://www.sciencedirect.com>

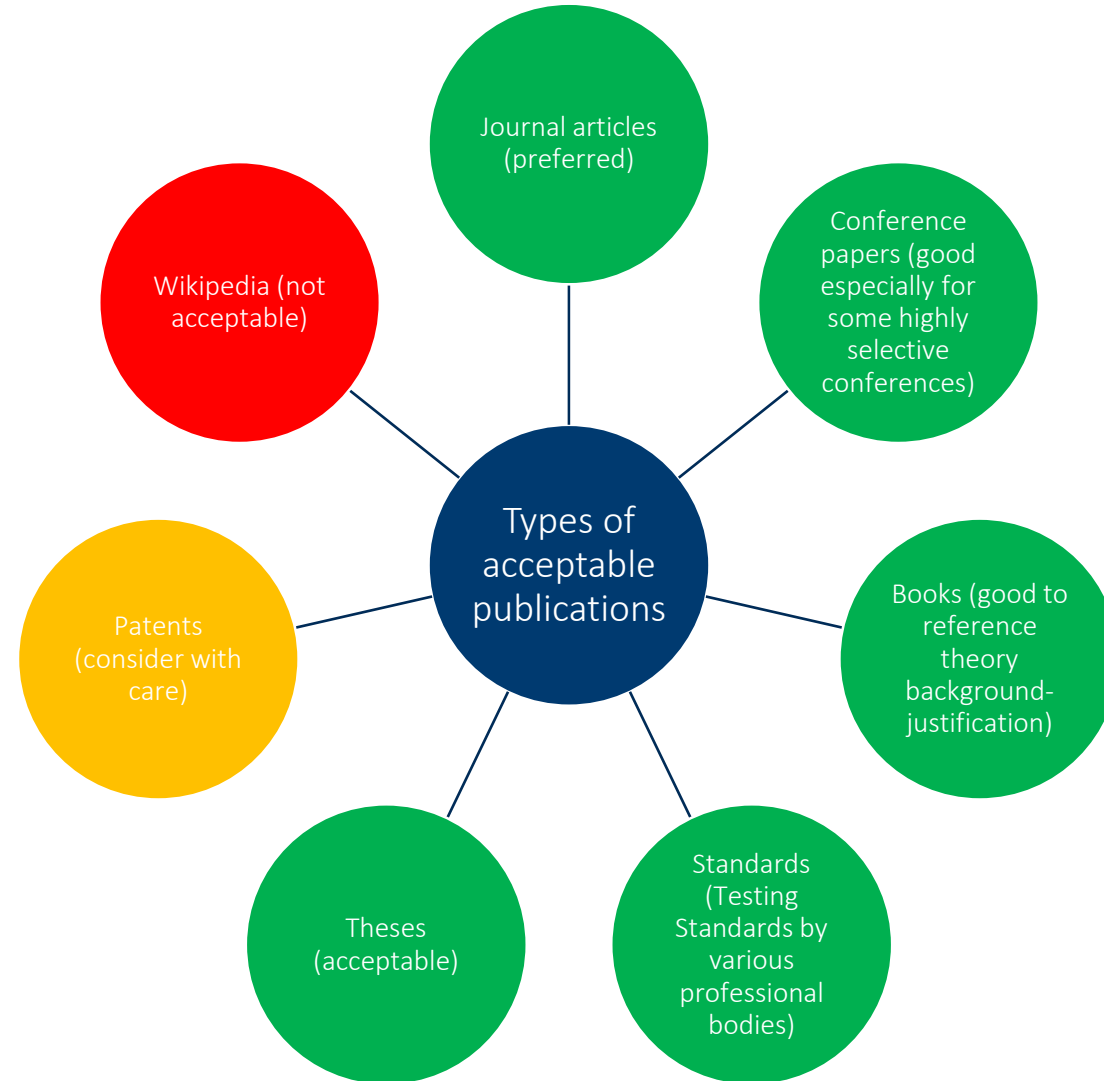
<http://ieeexplore.ieee.org/Xplore/home.jsp>

<https://www.researchgate.net/home>

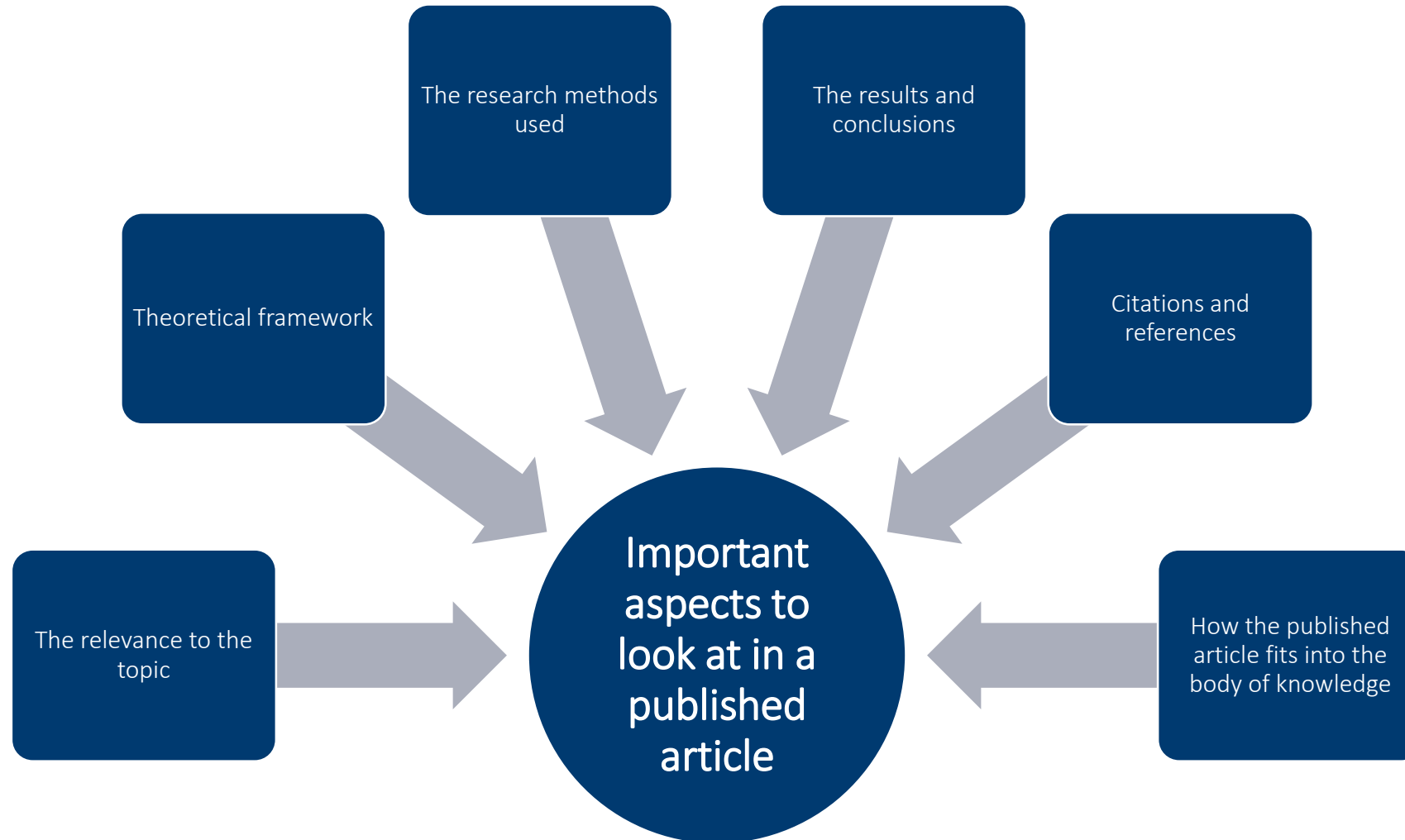
<https://www.academia.edu>

<http://citeseerx.ist.psu.edu/index>

Literature Review



Literature Review



- Capture information in a tabular form:

Author(s), Year	Title	Objectives	Research Design and Methodology	Data Collection and Analysis	Major Findings	Limitations	Relevance to your study	Notes

- Present it in text also as follows:

“Chen et al. (2010) studied the audio classification problem in the predictive maintenance context. Zero Crossing Rates (ZCR) were used as features and a Decision Tree as a classifier. They concluded that ZCR is a discriminant feature. 95% of classification accuracy was reported on the NABLA corpus.”

Some Tips:

- All literature reviews should be written in Past Tense
- Three or more sentences per paper review: sufficient details should be provided so that the reader can find the papers
- All papers mentioned in the literature review should be listed in the reference list
- Conclude the literature review by summarizing the findings: identifying strengths, weaknesses, and gaps. Then, position the research project clearly in relation to the literature.
 - This step lays the foundation for developing specific objectives to solve the research problem

Reference Sample

[1] J. Doe and A. Smith, "Innovations in Molecular Biology," Journal of Biological Research, vol. 47, no. 3, pp. 234-245, May 2023, doi: 10.1089/jbr.2023.2910.

<https://iee-dataport.org/sites/default/files/analysis/27/IEEE%20Citation%20Guidelines.pdf>

Reference Manger Software: <https://www.zotero.org/>

Research Design and Methodology

RD 1. Experimental Study

- **Methodology:** Identify and manipulate variables that affect the process, conduct experiments, collect data and analyze.

RD2. Survey-Based Study

- **Methodology:** Design questionnaires, select a representative sample, distribute surveys, analyze responses.

RD3. Simulation Studies

- **Methodology:** Create a model, run simulations under different scenarios, collect data, analyze outcomes computationally.

RD4. Original Research

- **Methodology:** Define a question, choose a suitable design, collect new data, analyze to generate insights.

Research Design and Methodology

- **Research Design:** Qualitative, Quantitative, Mixed Methods
- **Methods of Data Collection:** Surveys, Experiments, Simulations

Techniques for Data Analysis:

- **Estimation/Prediction:** Statistical, Analytical Methods, Mechanistic Models, Machine Learning Algorithms, Optimization
- **Strategies for Ensuring Validity:** Compare findings with previous research or run additional tests
- **Repeatability and Reliability of Your Research:** Clearly describe your methods so others can repeat the study. Use reliable tools and procedures

Research Proposal - Structure

- **Identify:** Define problem and establish the research question.
- **Justification:** Explain the research's significance and identify knowledge gaps or problems it addresses.
- **Introduction:** Introduce the topic and summarize the research focus.
- **Background / Review of Literature:** Summarize related research and explain how your work relates. Identify research gaps and define objectives.
- **Research Design and Methodology:** Describe data collection and analysis methods, including design and tools.
- **Time Frame and Work Schedule:** Outline the timeline, using a Gantt chart for task dates.
- **Personnel/ Facilities:** Needed/available
- **Budget/Savings:** Estimate costs for personnel, equipment, and materials.

Example: Defining Problem

Aim/Goal/Big Picture

Condition Monitoring of an Electric Motor

Focused:

Developing a Low-Cost, IoT-Based Predictive Maintenance System for Early Detection of Faults in Industrial Electric Motors

Application Focused:

Developing a Low-Cost, IoT-Based Predictive Maintenance System for Early Detection of Faults in Electric Motors used in Assembly lines/pumping stations/extraction equipment/food processing/pharmaceutical application

Example: Formulate Objectives

How does the implementation of a low-cost, IoT-based predictive maintenance system affect the early detection of faults in electric motors across different applications in terms of reducing downtime and operational costs?

Objectives

- 1. To Identify Key Performance Indicators (KPIs) for Electric Motor Health:** (Electrical Engineering - understanding motor)
- 2. To Develop or Utilize Advanced Diagnostic Tools:** (Instrumentation Engineering- Sensors and Data Acquisition)
- 3. To Establish Baseline Performance Metrics:** (Base Line Development)
- 4. To Integrate Predictive Maintenance Models:** (Predictive Models - Industrial Automation)

Example: Formulate Objectives

5. **To Evaluate the Impact of Maintenance Interventions:**
(Maintenance plan- Mechanical Engineering)
6. **To Design a User-Friendly Monitoring Interface:** (Ergonomics Aspect)
7. **To Conduct Cost-Benefit Analysis of Condition Monitoring:**
(Management Aspect)
8. **To Develop Training Programs for Maintenance Staff:**
(Manpower Development)
9. **To Assess Environmental Impact Reduction:** (Sustainability Analysis)

Example: Research Design & Methodology

For researching condition monitoring of electric motors, the methodology involves:

1. Literature Review & Expert Consultations:

Identify key performance indicators (KPIs) for motor health like vibration, temperature, through literature review and expert interviews.

2. Diagnostic Tool Development & Implementation:

Develop or select advanced diagnostic tools for real-time KPI monitoring, followed by testing for accuracy.

3. Baseline Performance Metrics Establishment:

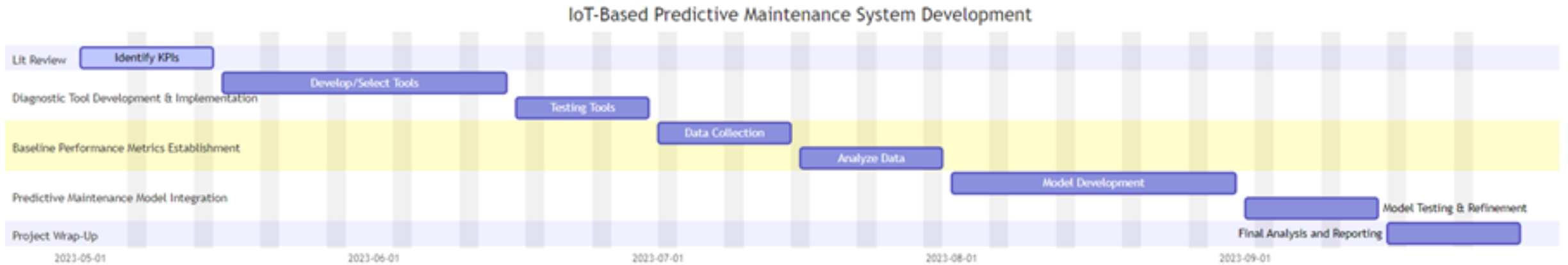
Collect data under normal operating conditions using these tools to establish baseline metrics for each KPI.

4. Predictive Maintenance Model Integration:

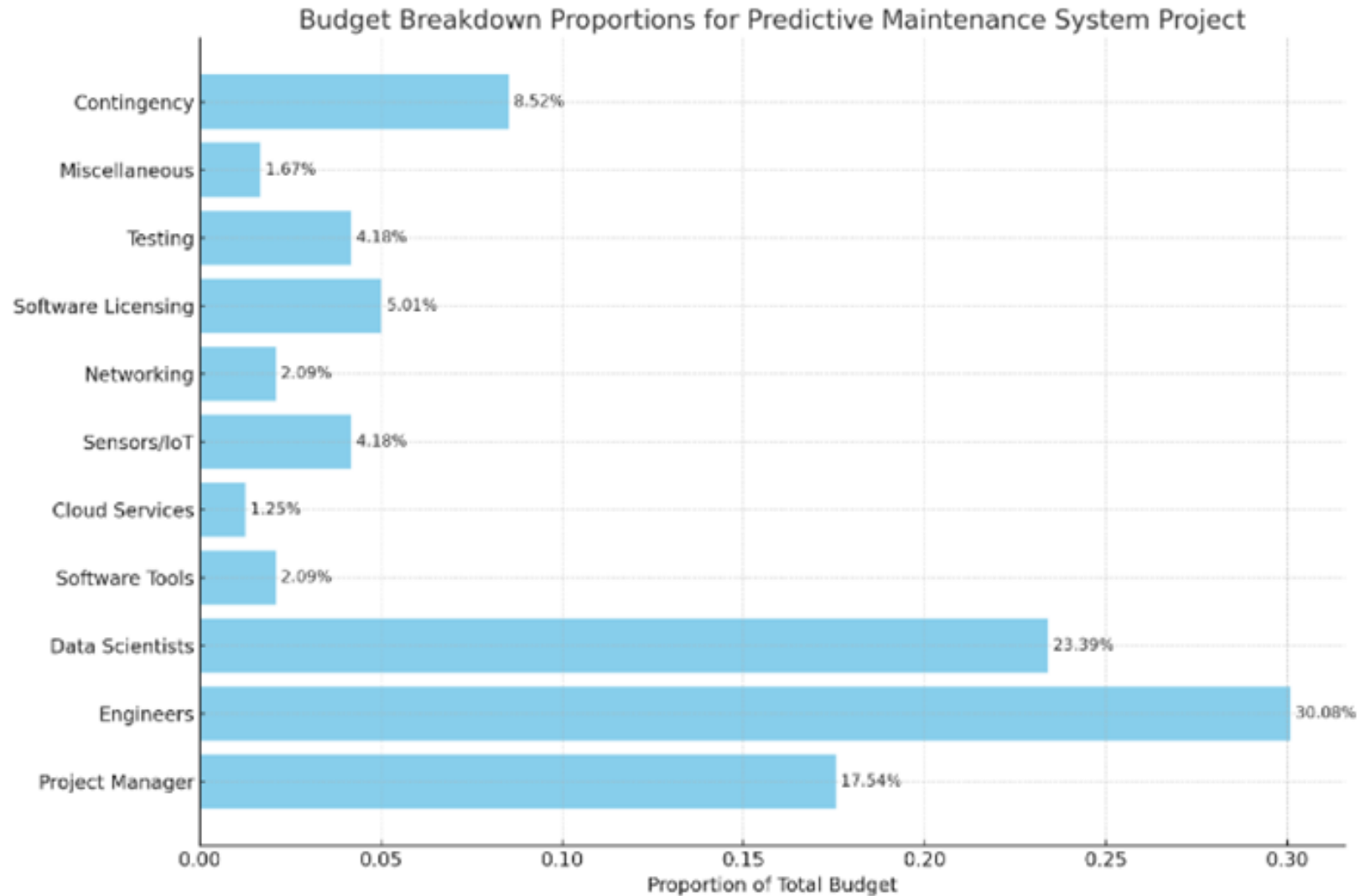
Use the collected data to develop predictive analytics and machine learning models to forecast failures, then validate and refine these models.

Research Timeline and Budget

Gantt chart for task dates



Research Timeline and Budget



Examples of Research Topics

Condition Monitoring

- High-Voltage Insulator Monitoring with UAV Thermal Imaging
- Predictive Maintenance in Manufacturing with Machine Learning
- Rotating Machinery Condition Monitoring Using Acoustic Emission
- Fiber Optic Sensors for Bridge Structural Health Monitoring

Material Testing

- High-Efficiency Solar Cell Semiconductor Material Characterization
- Sensor Material Performance Under Environmental Conditions
- Fatigue Testing and Analysis of Aerospace Composite Materials
- Reinforcement Corrosion Assessment in Concrete Structures

Examples of Research Topics

Parametric Studies

- Impact of Power Quality on Industrial Machinery Performance
- Impact of Different Control Strategies on Product Quality in High-Precision Manufacturing
- Effect of Process Parameters on Mechanical Properties in 3D Printing
- Impact of Constituent Variations on Concrete Mix Design for Durability and Performance

Examples of Research Topics

Estimation and Optimization

- Optimizing Energy Storage in Wind Farms for Supply-Demand Balance
- Real-Time Adaptive Control for Maximizing Wind Turbine Efficiency
- Machine Learning Optimization of Wind Turbine Maintenance Schedules
- Structural Integrity and Foundation Design Optimization in Wind Turbines

Examples of Research Topics

Sustainability

- Life Cycle Assessment of Next-Generation EV Battery Technologies
- Additive Manufacturing vs. Traditional Machining: A Comparative LCA
- Smart Manufacturing LCA: Enhancing Sustainability with IoT and AI
- Life Cycle Impacts of Bio-Based Construction Materials

Examples of Research Topics

Survey Studies

- Survey on the Integration Challenges of Solar Photovoltaic Systems into Existing Electrical Grids
- Industrial Robotics Adoption: A Survey of SMEs' Implementation Strategies and Obstacles
- Material Selection in Aerospace Engineering: A Survey on the Use of Composite Materials for Weight Reduction
- Sustainable Construction Practices: A Survey on Adoption and Barriers in Civil Engineering

Fuel your curiosity with unexplored
questions,
your research can lead to groundbreaking
discoveries...

Doctor of Engineering (On-Campus & Online)

Doctor of Engineering (online)

Upcoming intake: 22 July 2024

Duration: 36 months

Delivery mode: Online

On-Campus: Doctor of Engineering

Upcoming intake: 29 July 2024

Duration: 36 months

Delivery mode: On-Campus

Successful completion of the course will equip the graduate to take a leading role in the development of research investigations into current and future problems of industrial and community concern within their area of expertise. The program will give candidates the skills and experience to act as independent researchers or group leaders for investigations of practical importance in their professional area over their professional life.



4th Doctor of Engineering Conference (online)

16 - 17 April 2024

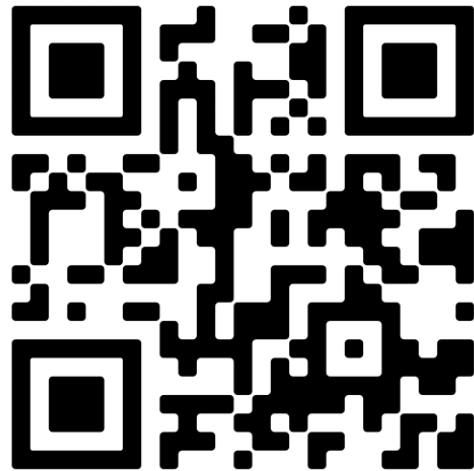
Register now!

www.eit.edu.au/event/4th-doctor-of-engineering-conference/

Thank you!

EIT Course Schedule & Enquiries

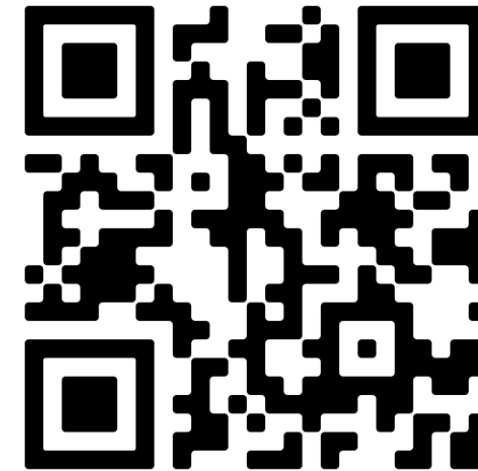
To view our **course schedule**,
scan the code below:



Alternatively, use the below link:

<https://qrco.de/bdhXUD>

For any enquiries, please **book a call**
with one of our friendly course advisors:



Alternatively, use the below link:

<https://qrco.de/bdsRCj>

Upcoming Webinars

All upcoming Events & Webinars:
www.eit.edu.au/news-events/events/

[4th Doctor of Engineering Conference](#)

16 Apr 2024

[An Introduction to Battery Energy Storage Systems and Their Power System Support](#)

18 Apr 2024

[Insights Into EIT's Postgraduate Programs](#)

24 Apr 2024

[Enhancing HVAC Efficiency: Load Calculation for Energy Conservation and Sustainability](#)

25 Apr 2024

[An Introduction to Process Control](#)

2 May 2024

Q&A



Engineering Institute of Technology.



Website

www.eit.edu.au



Head Office

1031 Wellington Street West Perth
Perth, WA 6005



Phone

Inside Australia: 1300 138 522
Outside Australia: +61 8 9321 1702



Email

webinars@eit.edu.au



Courses

<https://www.eit.edu.au/schedule/>