



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

ACFA7004 Research Methods & Professional Development

Lecture 2 – Research Proposal

Trawsnewid Addysg; Trawsnewid Bywydau
Transforming Education; Transforming Lives



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Recap

- Introduction to research.
- Characteristics
- Choosing your Topic
- Assignment for next week

Week 2 *learning outcomes*

- Assignment brief
- SMART Objectives
- Pending presentations
- Introduction to research Proposal.
- Elements of Research proposal

**THIS
WEEK**

Assessment Brief

- **Module:** Research Methods and Professional Development
- **Module Code:** ACFA7004
- **Level:** MSc (Level 7)
- **Assessment Breakdown:**
 - Coursework 1: Research Proposal (70%)
 - Coursework 2: Presentation (30%)

Assessment Brief

Coursework 1 – Research Proposal

Deadline: 1 May 2026 2 pm

Word Count: 4000 words (+appendices)

Submission: Via Turnitin (Do not upload the brief itself)

Ethics Form: Mandatory (submitted via Moodle separately)

AI Use: Research, structure, proofreading allowed; no content generation

Assessment Brief

Structure of Research Proposal

Introduction (35%)

- Context, background, current developments
- Problem definition & challenges
- Research Aim and SMART Objectives
- Significance & potential applications

Assessment Brief

Structure of Research Proposal

Introduction (35%)

- Context, background, current developments
- Problem definition & challenges
- Research Aim and SMART Objectives
- Significance & potential applications

Specific
Measurable
Achievable
Relevant
Time-bound

Assessment Brief

Structure of Research Proposal

Literature Review (25%)

- Thematic/Chronological structure
- Identify gaps, relate to your study
- Use relevant and recent academic sources

Assessment Brief

Structure of Research Proposal

Research Design and Methodology (25%)

- Research design approach (e.g., simulation, design science, analysis)
- Research method: Qualitative, quantitative, mixed
- Strategy: Case study, survey, experiment, etc.
- Tools, data sources, analysis & ethical considerations
- Technical tools and hardware/software (if applicable)

Assessment Brief

Structure of Research Proposal

Outcomes, Timeline, and Referencing

- **Expected Outcomes** (5%)
 - Predicted results, potential contributions, limitations
- **Timeline** (5%)
 - Include milestones and key activities (e.g., simple Gantt format)
- **References** (5%)
 - Proper citations, recent and credible sources
- Overall presentation of the proposal - 5%

Assessment Brief

Assessment Component 2

ALL students need to include an ethics form for their research.

The ethics committee representatives will review the form and approve it as necessary.

The ethics form will not be allocated a mark, but if not included the report will be deemed a failure

Assessment Brief

Structure of Research Proposal

Common Mistakes to Avoid

- Weak problem definition or vague objectives
- Outdated or few references
- No clear link between literature and research aim
- Missing ethics form = automatic fail
- Misuse of AI tools = academic misconduct

Assessment Brief

Use of Generative AI in Assessment

RESEARCH	For this assessment, you can use Generative AI to support you in research and data analysis.	Yes No
STRUCTURE	For this assessment, you can use Generative AI to support you in structuring your submission, including creating a draft argument structure, identifying parts and headings, etc.	Yes No
PROOFREADING	For this assessment, you can use Generative AI to check your own text/creation for grammatical and syntactical mistakes, including getting suggestions to rephrase your work.	Yes No
WRITING	For this assessment, you can use Generative AI to create text for submission.	Yes No
CREATIVE	For this assessment, you can use Generative AI to create creative materials, such as images.	Yes No
PROGRAMING	For this assessment, you can use Generative AI to create and check code.	Yes No
NONE	For this assessment, you are not allowed to use any type of Generative AI support. This includes research support, structure support, writing/proofreading support and creative support.	☐

Assessment Brief

Use of Generative AI in Assessment

RESEARCH	For this assessment, you can use Generative AI to support you in research and data analysis.	Yes ☒ No ☐
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WRITING	For this assessment, you can use Generative AI to create text for submission.	Yes ☐ No ☒
CREATIVE	For this assessment, you can use Generative AI to create creative materials, such as images.	Yes ☐ No ☒
PROGRAMING	For this assessment, you can use Generative AI to create and check code.	Yes ☐ No ☒
NONE	For this assessment, you are not allowed to use any type of Generative AI support. This includes research support, structure support, writing/proofreading support and creative support.	☐



Assessment Brief – Coursework 2

Presentation Overview

- Deadline: Week 10
- In-person Presentation: Week 11 20-April-2026
- Duration: 10 minutes
- Focus: Project management & professionalism based on your research topic

Assessment Brief – Coursework 2

Presentation Content Expectations

The presentation should include:

- Research context/background
- Research Problem [based on the identified research/Literature Gap]
- Research Aim and Objectives
- A brief literature review and summary that leads to the research/literature gap
- Research methodology
- Project planning and resources
- Project impact and limitations
- Reference

Assessment Brief – Coursework 2

Tips for an Effective Presentation

- Be concise and focused – 10 mins max
- Visual design: clean slides, limit text
- Speak clearly, maintain eye contact
- Rehearse to stay within time
- Reference your key sources briefly

Assessment Brief – Coursework 2

How Will You Be Assessed?

Grading Criteria:

- Literature Engagement
- Knowledge & Understanding
- Cognitive & Critical Skills
- Practical Application
- Transferable Skills (communication, planning, independence)

Assessment Brief – Coursework 2

Use of Generative AI Tools

Allowed for:

- Research exploration

- Draft structure and outlines

- Proofreading and paraphrasing your writing

NOT allowed:

- Full AI-generated text

- Image creation or coding for this task

Assessment Brief – Coursework 2

Final Reminders & Support

- Attend all proposal presentations during sessions
- Use feedback from presentation to improve proposal
- Access library databases for research
- Finalise topic approval

SMART Objectives

Specific:

- Define what exactly you want to achieve.
Focus on a narrow aspect of the research.

To develop a machine learning-based intrusion detection system (IDS) for detecting zero-day attacks in IoT networks.

To develop a lightweight cryptographic protocol tailored for low-power IoT sensors used in smart agriculture.

To design a blockchain-based framework for secure and transparent sharing of electronic health records (EHR) among healthcare providers.

SMART Objectives

Measurable:

- You should be able to assess progress using clear metrics.

To improve detection accuracy by at least 10% compared to existing IDS models (KNN or SVM) on a benchmark dataset such as NSL-KDD.

SMART Objectives

Achievable

Ensure the objective is realistic considering your time, resources, and skills.

To implement and evaluate the model using Python libraries (e.g., Scikit-learn, TensorFlow) within the available project timeline.

popular machine learning libraries in Python

SMART Objectives

Relevant

- The goal must align with the broader research problem and current challenges in the field.

To address the growing threat of IoT vulnerabilities by proposing a lightweight and accurate detection system that can be deployed on edge devices.

SMART Objectives

Time-bound

- Set a deadline or time frame for completion.

To complete the design and initial testing of the IDS prototype by the end of the third month and conduct full evaluation, documentation & presentation by stipulated timeframe

Assessment Brief – SMART Objectives

Combined:

To develop a machine learning-based intrusion detection system (IDS) for detecting zero-day attacks in IoT networks, aiming to improve detection accuracy by at least 10% compared to existing models such as KNN and SVM using the NSL-KDD dataset.

The model will be implemented and evaluated using Python libraries like Scikit-learn and TensorFlow within the available **6-month project timeline**.

This research addresses the increasing threat of IoT vulnerabilities by proposing a lightweight, deployable IDS suitable for edge devices. The system's prototype will be designed and initially tested by the end of the third month, with full evaluation and documentation completed by **month six**.

Activity-Identifying Research Gaps and Writing an Introduction

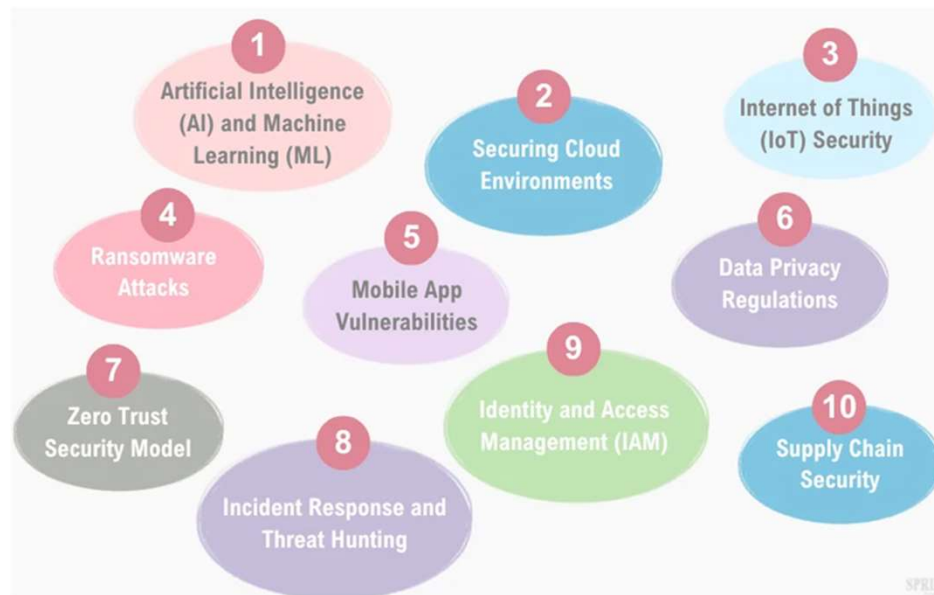
Objective:

This activity aims to develop your ability to identify **research gaps** in existing academic literature and write a concise **introduction section** for a potential research project in **digital forensics or cyber security**.

Activity-Identifying Research Gaps and Writing an Introduction

Instructions:

- Select a **specific concept** within digital forensics or cyber security (ransomware investigation techniques, IoT forensics, AI in threat detection, cloud evidence preservation, etc.).



Activity-Identifying Research Gaps and Writing an Introduction

Cyber Security Concepts

Ransomware Detection and Prevention

Phishing and Social Engineering Attacks

Network Intrusion Detection Systems (NIDS)

IoT Security

Cloud Security

Zero Trust Architecture

Cyber Threat Intelligence (CTI)

Cryptography and Data Privacy

Digital Forensics Concepts

Cloud Forensics

Mobile Device Forensics

Network Forensics

Malware Forensics

Memory Forensics

IoT Forensics

Blockchain Forensics

Activity-Identifying Research Gaps and Writing an Introduction

Instructions:

- Conduct a brief **literature review** using recent academic sources (journal articles, conference papers, standards, or reports).



Activity-Identifying Research Gaps and Writing an Introduction

Instructions:

- Conduct a brief **literature review** using recent academic sources (journal articles, conference papers, standards, or reports).

A broad overview of the research area.
A discussion of current developments, trends, or challenges in that area.
Enough context so the reader understands why your research topic is relevant today.

Activity-Identifying Research Gaps and Writing an Introduction- Context and Background

Instructions:

1. Start with a Broad Definition

Begin by introducing the *general area* of your study — Cyber Security, Digital Forensics, Network Security, or Cloud Forensics

"Cyber security involves protecting computer systems and networks from digital attacks aimed at accessing, changing, or destroying sensitive information."

Activity-Identifying Research Gaps and Writing an Introduction

Log in to RefWorks
(<https://refworks.proquest.com> or your institution link).

Create a folder/project for your assignment ("MSc RMPD Intro").

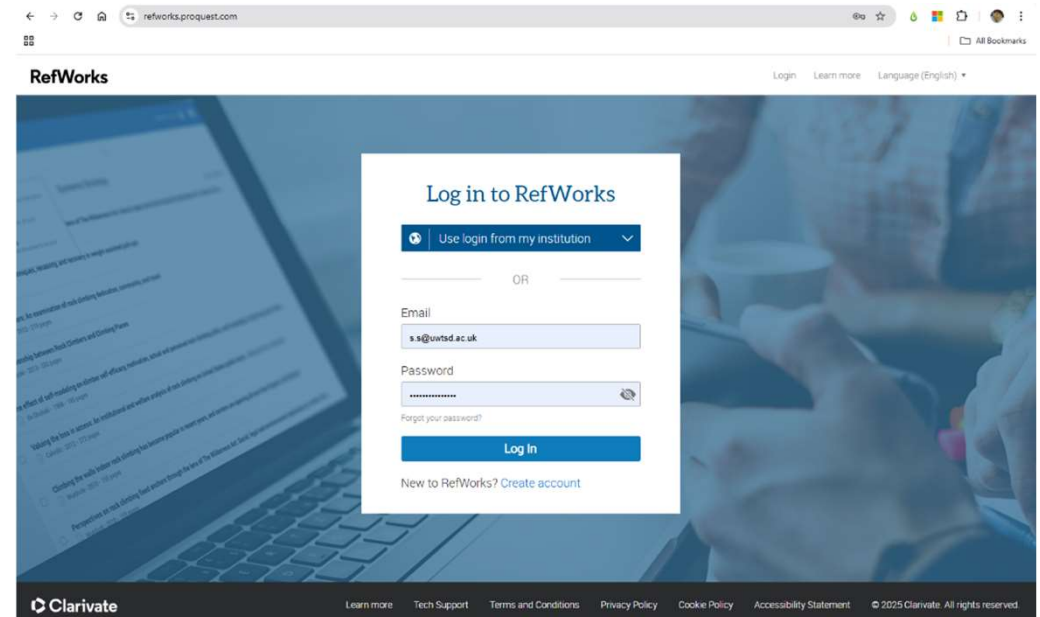
Import references:

Use "Save to RefWorks" browser button (if installed) while viewing an article; or

From RefWorks click Add > Import references and upload an RIS/EndNote file exported from a database; or

Click Add > Create new reference and enter details manually.

Check each imported record — ensure author names, journal title, volume, pages, year, DOI are correct. Edit metadata if needed.



Activity-Identifying Research Gaps and Writing an Introduction

The screenshot shows the RefWorks web interface in a browser. The address bar displays `refworks.proquest.com/search-databases/?advanced=true`. The interface has a blue header with the RefWorks logo, a user profile for 'PhD' (University of Wales Trinity Saint David), and language settings. A left sidebar contains navigation options like 'All References', 'Search Databases', 'Last Imported', 'Duplicates', 'Sharing', 'My Folders', 'Add folder', 'Sort', 'Not in Folder (3)', 'Sample (3)', 'Tags', and 'Trash'. The main area shows a search for 'Cloud Forensics' with a dropdown menu for 'PubMed' and a search button. A tooltip for 'Enable advanced queries?' is visible. The bottom status bar indicates 'Displaying all 0 references'.

Activity-Identifying Research Gaps and Writing an Introduction

The screenshot displays the RefWorks Proquest search interface. The browser address bar shows the URL: refworks.proquest.com/search-databases/?advanced=true. The interface includes a top navigation bar with the RefWorks logo, user information (PhD, University of Wales Trinity Saint David, Language (English), Suresh Shanmu...), and a search bar containing the text "Cloud Forensics".

On the left side, there is a sidebar menu with options: All References, Search Databases (selected), Last Imported, Duplicates, Sharing, My Folders, Add folder, Sort, Not in Folder (3), Sample (3), Tags, and Trash. Below the sidebar, there are links for Accessibility Statement, Privacy Policy, Terms and Conditions, Cookie Policy, and Manage cookie preferences.

The main content area shows a list of search results. The first three results are visible:

- ☐ Ahmed, Abdulghani Ali; Farhan, Khalid... Alselwi, Ghadir. (2024, December). Retrieving and Identifying Remnants of Artefacts on Local Devices Using Sync.com Cloud. Tags: Sync.com cloud, cloud company, cloud computing, +4.
- ☐ Horsman, Graeme. (2021, January). A case study on anonymised sharing platforms and digital traces left by their usage. Tags: Browser forensi..., Cloud forensics, Digital forensics, +3.
- ☐ Teing, Yee-Yang; Dehghantanha, Ali... Conti, Mauro. (2017, May). Forensic Investigation of Cooperative Storage Cloud Service: Symform as a Case Study. Tags: Symform analys..., cloud forensics, cooperative clo..., +5.

At the bottom of the results list, it says "Displaying all 3 references".

Activity-Identifying Research Gaps and Writing an Introduction

The screenshot displays the RefWorks Proquest search interface. The browser address bar shows the URL: refworks.proquest.com/search-databases/?advanced=true. The RefWorks header includes the user's name, Suresh Shanmu, and the institution, University of Wales Trinity Saint David. The search results are for the query "Cloud Forensics" in the PubMed database. The results list three articles, each with a checkbox for selection and a "Sort by" dropdown set to "Date added".

Search Results:

- ☐ Ahmed, Abdulghani Ali; Farhan, Khalid... Alselwi, Ghadir. (2024, December). Retrieving and Identifying Remnants of Artefacts on Local Devices Using Sync.com Cloud. Tags: Sync.com cloud, cloud company, cloud computing, +4.
- ☐ Horsman, Graeme. (2021, January). A case study on anonymised sharing platforms and digital traces left by t... Tags: Browser forensi..., Cloud forensics, Digital forensics, +3.
- ☐ Teing, Yee-Yang; Dehghantanha, Ali... Conti, Mauro. (2017, May). Forensic Investigation of Cooperative Stora... Tags: Symform analys..., cloud forensics, cooperative clo..., +5.

Reference Details (Right Panel):

Ref ID: Journal Article | Electronic

Retrieving and Identifying Remnants of Artefacts on Local Devices Using Sync.com Cloud

[Check for full text at UWTSO](#)

[Full Text](#)

Reference details | Related articles | [Full Text](#)

Authors
Ahmed, Abdulghani Ali; Farhan, Khalid; Ninggal, Mohd Izuan Hafez; Alselwi, Ghadir

Abstract
Most current research in cloud forensics is focused on tackling the challenges encountered by forensic investigators in identifying and recovering artifacts

[View full abstract](#)

Tags
cloud company services, cloud computing, cloud forensics, cyber investigation

[View all tags](#)

Periodical, Abbreviated
Sensors (Basel)

Date Published
December 27, 2024

Activity-Identifying Research Gaps and Writing an Introduction

The screenshot shows a PDF viewer interface. The top bar indicates the file path: C:/Users/s.s/Downloads/sensors-25-00106-v2.pdf. The left sidebar shows a table of contents with four pages. The main content area displays the article from the journal 'sensors' (MDPI). The article title is 'Retrieving and Identifying Remnants of Artefacts on Local Devices Using Sync.com Cloud'. The authors are Abdulghani Ali Ahmed, Khalid Farhan, Mohd Izuan Hafez Ninggal, and Ghadir Alsawi. The abstract discusses challenges in cloud forensics and proposes a two-stage investigation technique. The keywords are cloud forensics, cloud company services, web browser, Sync.com cloud, digital forensics, cyber investigation, and cloud computing. The introduction section begins with a paragraph about cloud computing's popularity and its impact on businesses and consumers.

Retrieving and Identifying Remnants of Artefacts on Local Devices Using S...

1 / 27 100%

sensors MDPI

Article

Retrieving and Identifying Remnants of Artefacts on Local Devices Using Sync.com Cloud

Abdulghani Ali Ahmed ^{1,*}, Khalid Farhan ², Mohd Izuan Hafez Ninggal ³ and Ghadir Alsawi ²

¹ School of Computer Science and Informatics, Faculty of Computing, Engineering and Media, De Montfort University, Leicester LE1 9BH, UK
² School of Computer Science and Engineering, University of New South Wales, Sydney, NSW 2052, Australia; k.farhan@unsw.edu.au (K.F.)
³ Faculty of Computer Science & Information Technology, Universiti Putra Malaysia, Serdang, Selangor 43400, Malaysia; mohdizuan@upm.edu.my
* Correspondence: aa.ahmed@dmu.ac.uk

Abstract: Most current research in cloud forensics is focused on tackling the challenges encountered by forensic investigators in identifying and recovering artifacts from cloud devices. These challenges arise from the diverse array of cloud service providers as each has its distinct rules, guidelines, and requirements. This research proposes an investigation technique for identifying and locating data remnants in two main stages: artefact collection and evidence identification. In the artefacts collection stage, the proposed technique determines the location of the artefacts in cloud storage and collects them for further investigation in the next stage. In the evidence identification stage, the collected artefacts are investigated to identify the evidence relevant to the cybercrime currently being investigated. These two stages perform an integrated process for mitigating the difficulty of locating the artefacts and reducing the time of identifying the relevant evidence. The proposed technique is implemented and tested by applying a forensics investigation algorithm on Sync.com cloud storage using the Microsoft Windows 10 operating system.

Keywords: cloud forensics; cloud company services; web browser; Sync.com cloud; digital forensics; cyber investigation; cloud computing

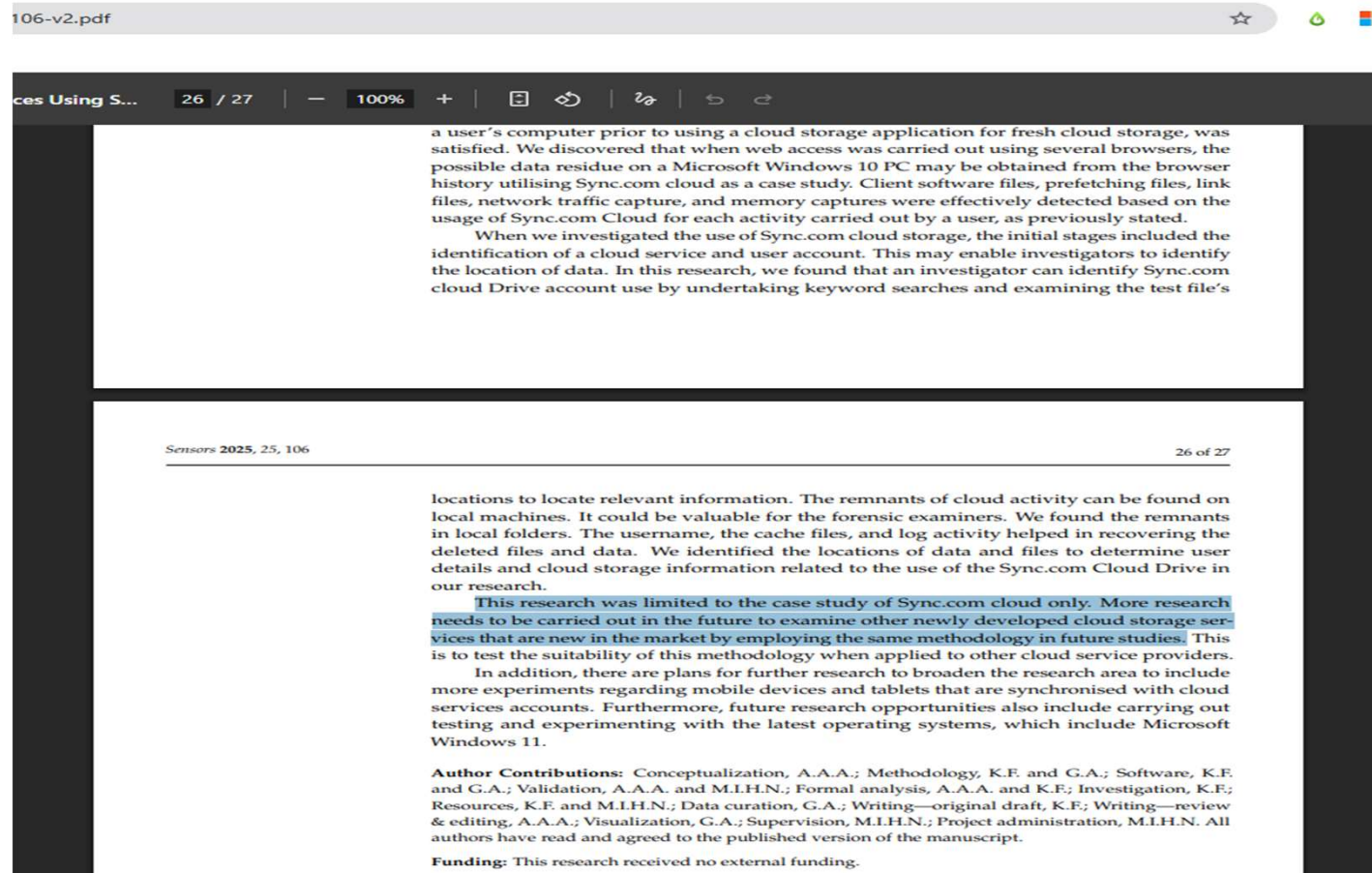
check for updates
Academic Editor: Alessandra Rizzardi
Received: 9 October 2024
Revised: 16 December 2024
Accepted: 17 December 2024
Published: 27 December 2024

1. Introduction

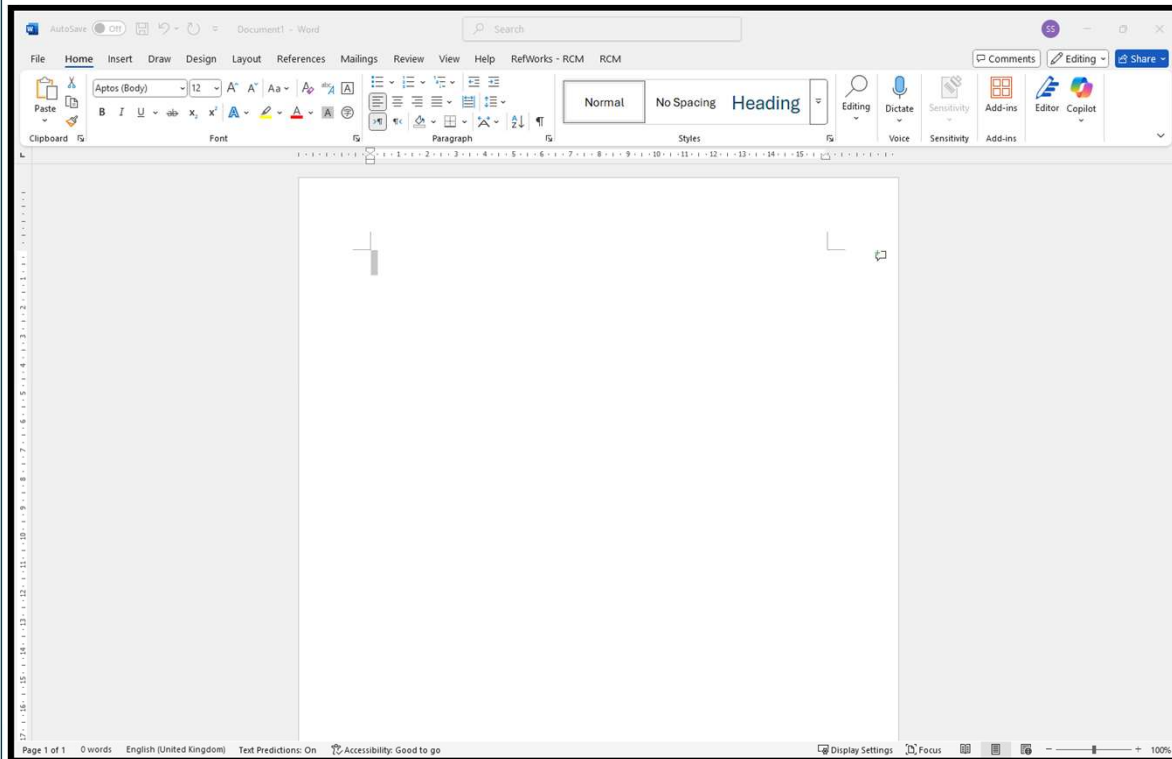
Cloud computing has gained significant recognition and popularity as technology has advanced, providing a wide range of computing services to numerous businesses and consumers. Organisations frequently utilise cloud computing resources to replace large,



Activity-Identifying Research Gaps and Writing an Introduction

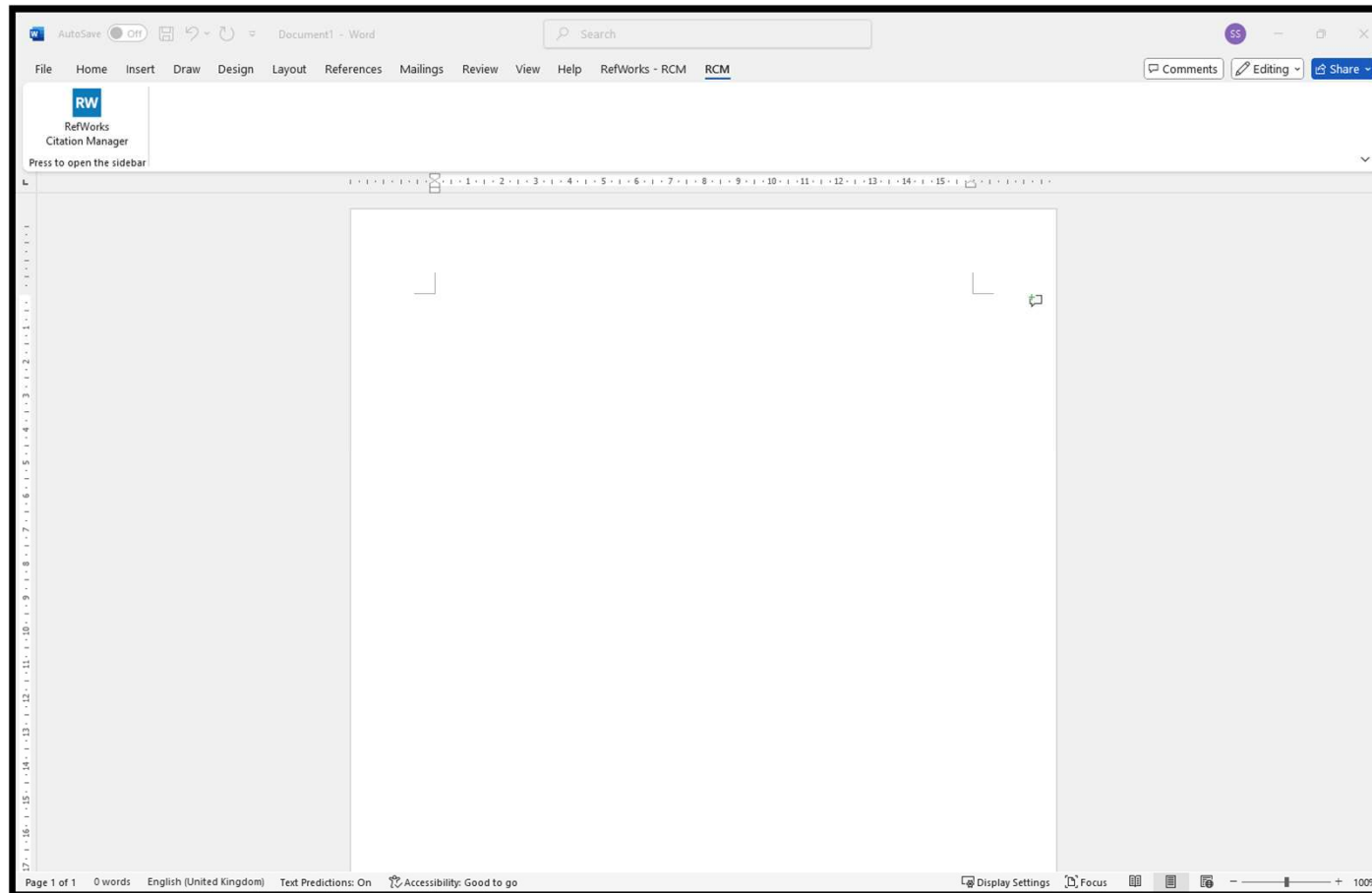


WRITE THE BRIEF REVIEW (in MS Word) and cite using RefWorks Citation Manager

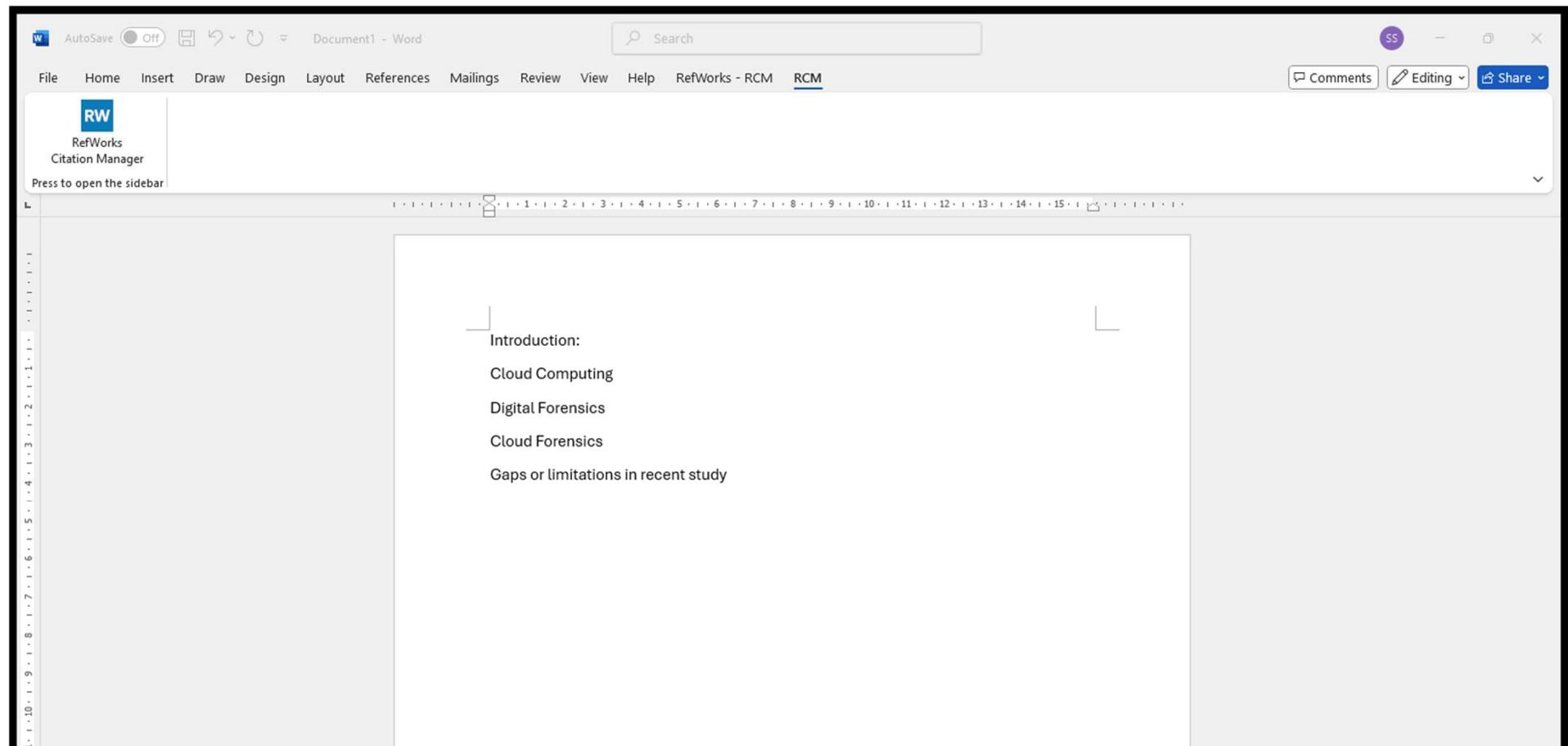


Start a new Word doc and install/open RefWorks Citation Manager (RCM) in Word: Insert → Get Add-ins → search RefWorks → Get. (Microsoft add-ins guidance).

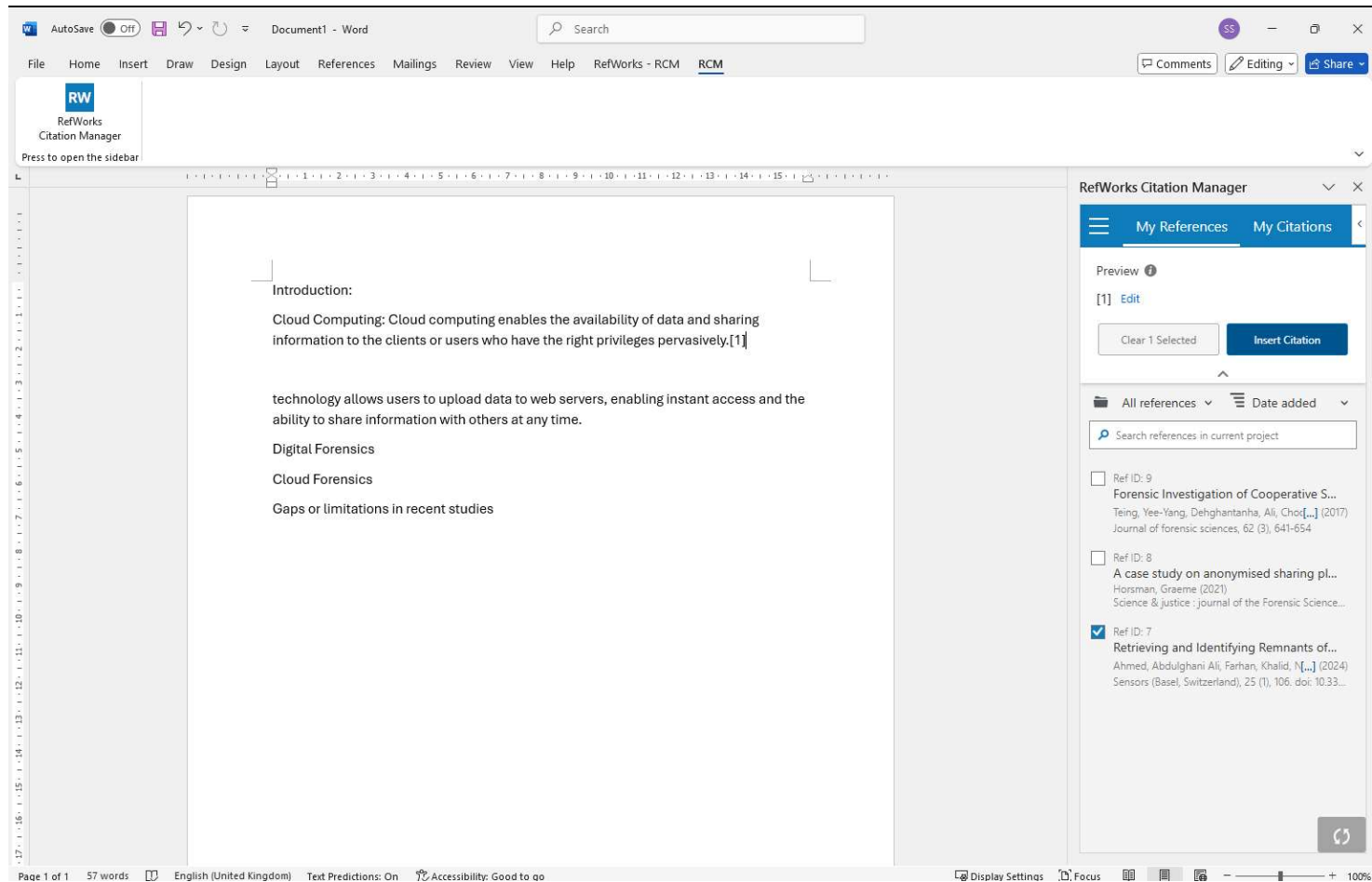
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WRITE THE BRIEF REVIEW (in MS Word) and cite using RefWorks Citation Manager

The screenshot shows the Microsoft Word interface with the RefWorks Citation Manager (RCM) sidebar open on the right. The document content includes:

Introduction:

Cloud Computing: Cloud computing enables the availability of data and sharing information to the clients or users who have the right privileges pervasively.[1]

Digital Forensics: digital forensics technology helps the investigators to determine the cause of data breaches and other crimes in the cyber space by substantiating the evidences from the incidents. [1]

Cloud Forensics: Cloud forensics aid the investigators to observe the findings from the cloud devices through the investigative procedure.[1]

Gaps or limitations in recent studies

The RefWorks Citation Manager sidebar on the right shows the 'My References' tab. It includes a 'Preview' section with a list of references. The first reference is selected (checked):

- ☒ Ref ID: 7
Retrieving and Identifying Remnants of...

Other references listed include:

- ☐ Ref ID: 9
Forensic Investigation of Cooperative S...
Teing, Yee-Yang, Dehghantanha, Ali, Choc[...] (2017)
Journal of forensic sciences, 62 (3), 641-654
- ☐ Ref ID: 8
A case study on anonymised sharing pl...
Horsman, Graeme (2021)
Science & justice : journal of the Forensic Science...

WRITE THE BRIEF REVIEW (in MS Word) and cite using RefWorks Citation Manager

The image shows a Microsoft Word document on the left and the RefWorks Citation Manager interface on the right. The Word document contains the following text:

Cloud Forensics: Cloud forensics aid the investigators to observe the findings from the cloud devices through the investigative procedure.[1]

Gaps or limitations in recent studies

Earlier research focused only on a case study using the Sync.com cloud storage service. This means the results cannot be easily applied to other cloud platforms. To build on this work, the current study will include different cloud storage providers and use the same forensic approach to test how well it works in various environments.[1]

Previous studies also did not look at mobile devices and tablets that connect or synchronize with cloud accounts. Since these devices are now widely used, this research will examine how synchronization affects digital evidence and what new artefacts can be found.[1]

Finally, this study will also explore the use of the latest operating systems, such as Microsoft Windows 11, to discover any new forensic artefacts and check whether existing methods still work effectively with newer technologies.[1]

This research was limited to the case study of Sync.com cloud only. More research needs to be carried out in the future to examine other newly developed cloud storage services that are new in the market by employing the same methodology in future studies. This is to test the suitability of this methodology when applied to other cloud service providers. In addition, there are plans for further research to broaden the research area to include more experiments regarding mobile devices and tablets that are synchronised with cloud services accounts. Furthermore, future research opportunities also include carrying out testing and experimenting with the latest operating systems, which include Microsoft Windows 11.

The RefWorks Citation Manager interface on the right shows a preview of a citation for Ref ID 7: "Retrieving and Identifying Remnants of ... Ahmed, Abdulghani Ali, Farhan, Khalid, ... Sensors (Basel, Switzerland), 25 (1), 106. ...". It includes options to add prefix/suffix, display as author (year), include author, and include date. There are buttons for "Delete Citation" and "Update Citation". The bottom status bar of the Word document shows "Page 1 of 2", "320 words", "English (United Kingdom)", "Text Predictions: On", and "Accessibility: Good to go".

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Gaps or limitations in recent studies

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RefWorks Citation Manager

- References homepage
Find references and insert citations
- Citation style
IEEE UWTSD (Institutional)
- Project
PhD
- Refresh and update
Refresh references from RefWorks and update document
- Citation formatting: On
To reduce processing times, turn citation formatting OFF. Citations will not be formatted until formatting is turned back ON.
- Bibliography: Off
To update the bibliography each time you add or remove citations from your document, turn bibliography ON.

Finally, this study will also explore the use of the latest operating systems, such as

Microsoft Windows 11, to discover any new forensic artefacts and check whether existing methods still work effectively with newer technologies.[1]

References

[1] A. A. Ahmed, et al., "Retrieving and Identifying Remnants of Artefacts on Local Devices Using Sync.com Cloud," *Sensors (Basel)*, vol. 25, no. 1, pp.106. doi: 10.3390/s25010106, December 27 2024. doi: 10.3390/s25010106.

RefWorks Citation Manager

References homepage
Find references and insert citations

Citation style
IEEE UWTSD (Institutional)

Project
PhD

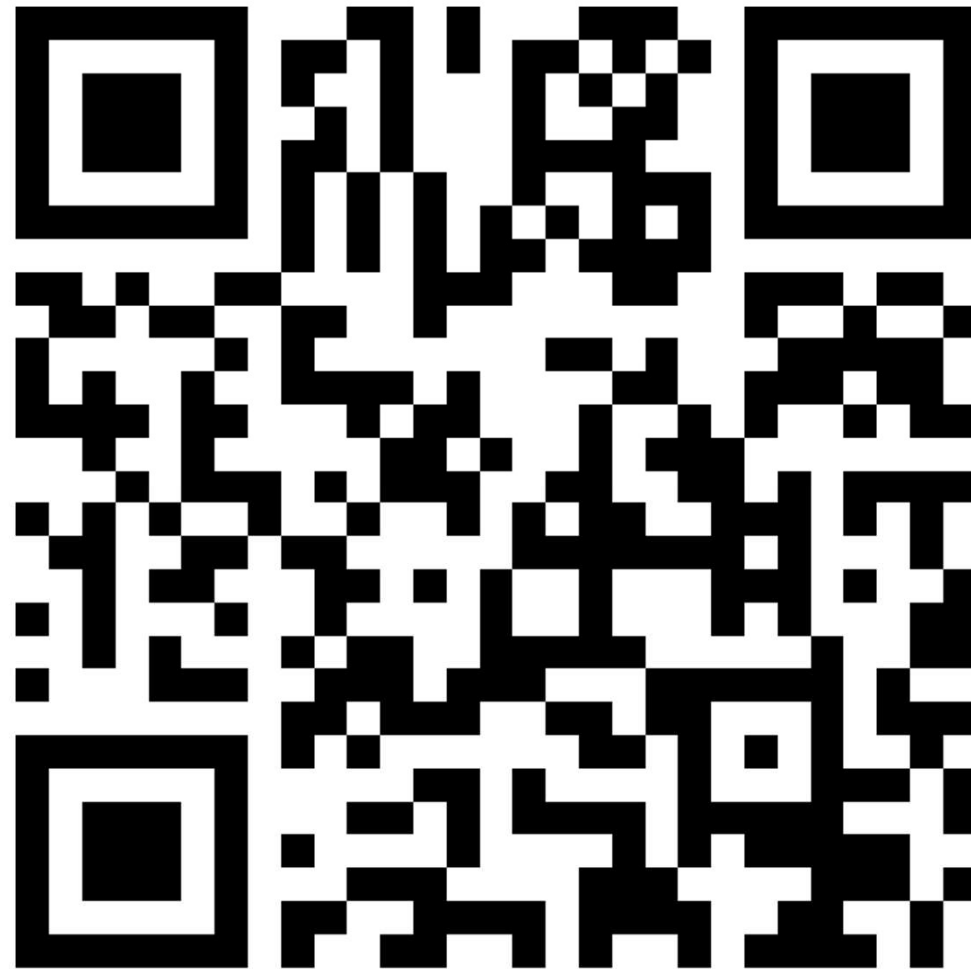
Refresh and update
Refresh references from RefWorks and update document

Citation formatting: On
To reduce processing times, turn citation formatting OFF. Citations will not be formatted until formatting is turned back ON.

Bibliography: On
To reduce processing times, turn bibliography OFF. When citation formatting is OFF, bibliography will not be automatically updated.

Activity- Submission point

<https://forms.office.com/e/b9ihy8s4fZ>



Introduction & Background (Guidelines)

1. Start with a Broad Definition

Begin by introducing the *general area* of your study — Cyber Security, Digital Forensics, Network Security, or Cloud Forensics.

“Cyber security involves protecting computer systems and networks from digital attacks aimed at accessing, changing, or destroying sensitive information.”

Introduction & Background (Guidelines)

2. Explain Where It's Applied (Your Subfield or Context)

Narrow the discussion to your **specific area of focus**, such as IoT security, malware forensics, or ransomware detection.

"In recent years, cyber security in cloud environments has gained attention due to the increasing adoption of cloud-based services by organizations."

Introduction & Background (Guidelines)

3. Describe Current Developments / Trends
Highlight **recent advancements, technologies, or methods** in your chosen area (2020–2025).

“Machine learning-based intrusion detection systems are increasingly being used to identify anomalies in network traffic.”

Introduction & Background (Guidelines)

4. Mention Current Challenges / Gaps

Identify **what problems still exist** in your research area — such as lack of standardization, privacy issues, or technical limitations.

"However, existing systems often struggle to detect zero-day attacks due to their reliance on known signatures."

Introduction & Background (Guidelines)

5. Justify the Need for Further Research

Conclude this section by explaining **why your study is relevant** and how it contributes to improving practice, theory, or technology.

"Therefore, ongoing research into adaptive intrusion detection is vital to strengthen proactive cyber defense strategies."

Introduction & Background (Example)

Context and Background

Cyber security is a critical field focused on protecting computer systems, networks, and data from unauthorized access and malicious activities [1]. With the rapid adoption of cloud computing and Internet of Things (IoT) technologies, organizations now face an expanding threat landscape that challenges traditional perimeter-based defense mechanisms [2], [3]. Recent developments such as artificial intelligence (AI)-driven intrusion detection systems and blockchain-based data integrity solutions have significantly advanced the security domain by enabling more adaptive and transparent protection methods [4], [5].

However, attackers continue to exploit software vulnerabilities and system misconfigurations, leading to increasingly sophisticated threats such as ransomware, zero-day exploits, and advanced persistent threats (APTs) [6], [7]. These evolving issues highlight persistent challenges in maintaining data confidentiality, availability, and integrity across distributed systems. Consequently, research into adaptive and intelligent security mechanisms remains essential for strengthening proactive defense and ensuring resilient cyber infrastructures [8], [9].

Introduction & Background (Example)

References

- [1] W. Stallings, *Computer Security: Principles and Practice*, 5th ed. Pearson, 2023.
- [2] ENISA, "Threat Landscape 2024," *European Union Agency for Cybersecurity*, 2024. [Online]. Available: <https://www.enisa.europa.eu>
- [3] S. K. Singh and R. Tan, "Security challenges in Internet of Things: A review," *IEEE Internet of Things Journal*, vol. 10, no. 4, pp. 3102–3115, 2023.
- [4] A. Sharma, M. Gupta, and P. Kumar, "AI-based intrusion detection using deep learning for cloud security," *IEEE Access*, vol. 11, pp. 14567–14579, 2023.
- [5] Z. Lin and H. Zhang, "Blockchain for data integrity and auditability in cyber-physical systems," *Computers & Security*, vol. 127, 103172, 2024.
- [6] Verizon, *2024 Data Breach Investigations Report*, Verizon Communications, 2024.
- [7] M. Alasmay et al., "A survey on zero-day attack detection: Methods and challenges," *IEEE Transactions on Network and Service Management*, vol. 20, no. 1, pp. 200–215, 2023.
- [8] S. Shaukat and A. Khan, "Adaptive cyber defense mechanisms using reinforcement learning," *Journal of Cybersecurity*, vol. 9, no. 2, pp. 1–15, 2024.
- [9] NIST, "AI Risk Management Framework (NIST AI 100-1)," *National Institute of Standards and Technology*, 2023.

Group Activity- (2-3 members)

- By the end of this activity, students will be able to formulate a clear, focused, and realistic SMART objective for a computing-related research proposal.

Group Activity- (2-3 members)

Choose a research topic or project idea in computing.

Some examples:

- Cybersecurity
- AI for healthcare
- Game development
- Accessibility technology
- IoT or Smart Cities

Group Activity- (2-3 members)

- For the selected topic, **brainstorm a draft goal**

“Build an AI model for detecting phishing emails”

Group Activity- (2-3 members)

- As a group, break the goal down into the five SMART components:

Specific: What exactly do you want to develop or explore?

Measurable: What metrics will show success?

Achievable: Is this realistic with your tools, skills, and time?

Relevant: How does this connect to real-world problems or research gaps?

Time-bound: What is the project timeline?

Group Activity- (2-3 members)

- Each group now creates their **own SMART objective**, based on the the group's topic
- Template to Guide Writing:
"To [Specific action/goal], aiming to [Measurable target], using [Achievable methods/tools] within [Time-bound frame], in order to [Relevant impact/purpose]"

Group Activity- (2-3 members)

- Each group now creates their **own SMART objective**, based on the the group's topic
- Template to Guide Writing:
"To [Specific action/goal], aiming to [Measurable target], using [Achievable methods/tools] within [Time-bound frame], in order to [Relevant impact/purpose]"

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Question slide

Research Topic?



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Results slide

Research Topic?

RESULTS SLIDE



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Give 1 SMART Objective

"To [Specific action/goal], aiming to [Measurable target], using [Achievable methods/tools] within [Time-bound frame], in order to [Relevant impact/purpose]"



##/##

Join at: **vevox.app**ID: **148-340-450**

Results slide

Give 1 SMART Objective

"To [Specific action/goal], aiming to [Measurable target], using [Achievable methods/tools] within [Time-bound frame], in order to [Relevant impact/purpose]"



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RESULTS SLIDE

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Group Activity- (2-3 members)

- Each group presents their SMART objective briefly (2–3 minutes). Other groups listen and provide quick feedback using this checklist:
 - Is the objective **clearly stated**?
 - Does it meet all five SMART criteria?
 - Is the **measurable** part realistic?
 - Is it **aligned with the chosen topic**?
 - Does it sound **feasible** and time-appropriate?

Group Activity – Rating sheet

<https://forms.office.com/e/FJkK9Z4tb1>



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Activity- Choosing a topic

<https://forms.office.com/e/FFD8MwV5rY>

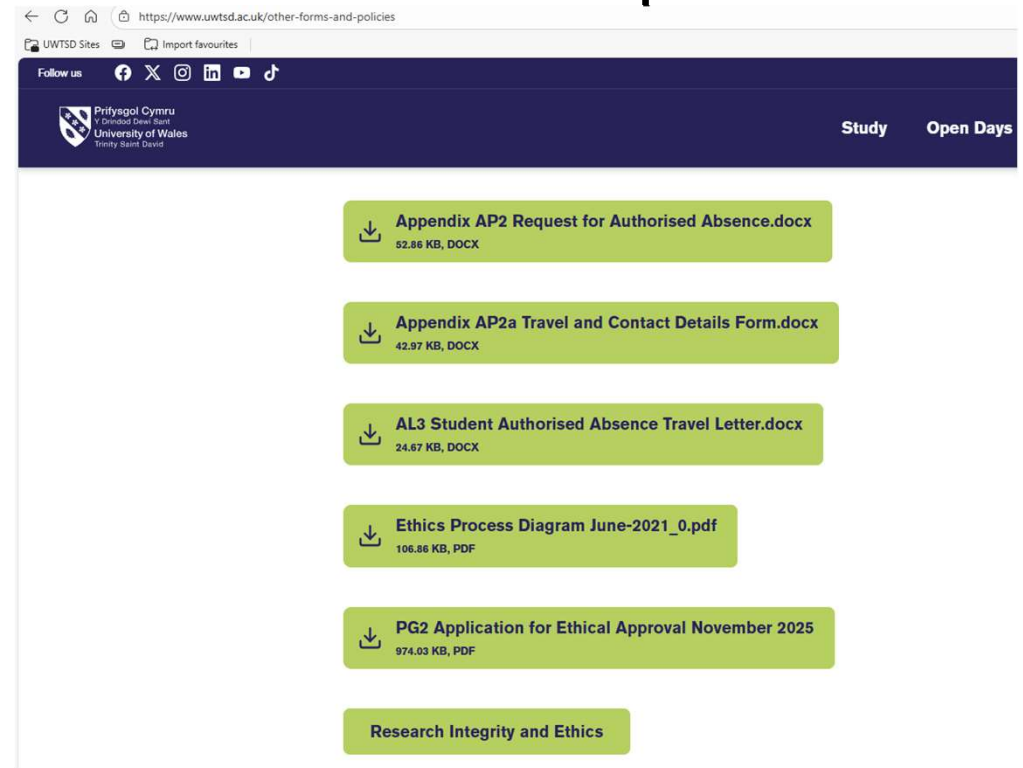


Research_Topic_Worksheet_CS_Lecture 1.pdf

Ethics Form

[Other Forms and Policies | University of Wales
Trinity Saint David](https://www.uwtsd.ac.uk/other-forms-and-policies)

<https://www.uwtsd.ac.uk/other-forms-and-policies>



Ethics Form

SECTION A: About You

Fill in your:

- **Full Name**
- **Student Number**
- **University Email Address**
- **Programme of Study:** *MSc Cyber Security and Digital Forensics*
- **Supervisor's Name**

Ethics Form

SECTION B: Ethical Guidance

Tick the relevant documents you've referred to:

- **UWTSD Research Ethics & Integrity Code of Practice**
- **UWTSD Research Data Management Policy**
- Any **cyber-specific or data ethics guidelines** (e.g., NCSC Code of Conduct, BCS guidelines, or ACM Code of Ethics if applicable)

Ethics Form

SECTION C: Research Details

1. Title

Write a clear working title for your dissertation project.

2. Dates

Provide approximate start and end dates of your project.

3–6. Project Summary (max 300 words each)

Explain each clearly and simply:

- **Purpose** – Why is your research important?
- **Research Question** – State your main research question.
- **Aims** – What does your project intend to achieve overall?
- **Objectives** – List the smaller steps or specific goals.

7. Data Collection Methods

- Describe your methods (e.g., online survey, system testing, interviews, penetration testing on test environments, etc.).

Ethics Form

SECTION D: Scope of Research

- Tick **YES** or **NO** for each method listed (e.g., interview, observation, log files, etc.).
If you say **YES** to any item, you *must complete Section E as well*.

Ethics Form

SECTION E: Intended Participants

Answer the following:

- Who are your participants (e.g., university students, IT professionals)?
- How will you recruit them?
- How many are expected?
- Tick **YES/NO** for each type (students, adults, children, etc.).

If your project has no participants, tick **NO** for all and skip to **Section F**.

Ethics Form

SECTION F: Risk Assessment

For each risk area:

- **Participants** – e.g., data privacy risks, emotional impact
 - **Investigator (You)** – e.g., burnout, dealing with sensitive topics
 - **University** – e.g., data breach, reputational risk
 - **Environment** – e.g., N/A unless your project affects physical environments
- Provide **mitigation steps** for each.

Ethics Form

SECTION G: Consent and Confidentiality

If participants are involved:

- Explain how you'll obtain **informed consent** (written or online)
- Clarify **how you'll maintain anonymity/confidentiality**
- Describe how you'll **debrief** participants and provide them support or contact information

Ethics Form

SECTION H: Data Protection and Storage

Be **specific** about:

- **What personal data** is collected (e.g., names, emails, IP addresses)
- Whether any **special category data** (e.g., health, ethnicity) is involved
- How and where data will be:
 - Stored (e.g., University OneDrive, encrypted USB)
 - Protected (e.g., encryption, pseudonymisation)
 - Shared (if at all)
 - Deleted after the project
- ☒ Confirm you've read the data policy
- ☒ Confirm you will keep data until after your research ends

Ethics Form

SECTION H: Data Protection and Storage

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 - Shared (if at all)
 - Deleted after the project
- ☒ Confirm you've read the data policy
- ☒ Confirm you will keep data until after your research ends

Ethics Form

SECTION I: Declaration

- Sign and date the form
- Supervisor also must sign and date it

Ethics Form

Tips

- Use **non-technical language** where asked (especially in Section C).
- Avoid leaving any section blank.
- If you **don't use human participants**, clearly state "**N/A**" where applicable.
- Use secure university storage for **all personal or research data**.

<https://forms.office.com/e/pmFWVgvpJJ>



Research Topic & Ethics
form

Research Proposal

In your opinion, what is a research proposal?



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Research Proposal

A research proposal is a short, structured document that explains:

What you want to research,

Why it's important or interesting,

How you plan to do it.

Why is a Research Proposal Important?

Why Is a Research Proposal Important?

It helps you organize your ideas.

It shows your supervisor that you're thinking critically.

It saves time by helping you avoid confusion or mistakes later on.

It gives others a chance to give feedback or guidance before you start.

A research proposal idea or just a statement — and why.

Scenario(s)	Brief Research Proposal idea(Yes or No)?
I want to study how students use artificial intelligence tools like ChatGPT to complete homework	
Artificial intelligence is changing the world	
This study will explore the effectiveness of gamified learning apps on students' motivation in computer science classes.	
Computers are very useful in education.	
My research will examine whether online coding platforms like Codecademy improve the problem-solving skills of high school students.	
Technology is advancing quickly these days.	

A research proposal idea or just a statement — and why.

Scenario(s)	Brief Research Proposal (Yes or No)?
I want to study how students use artificial intelligence tools like ChatGPT to complete homework	Yes—a clear topic, a focus on behavior, and suggests something that can be explored through research
Artificial intelligence is changing the world	No- It's too broad and general. There's no research question, objective, or specific focus.
This study will explore the effectiveness of gamified learning apps on students' motivation in computer science classes.	Yes—clearly states what is being studied (gamified learning apps) and who it affects (computer science students) — and suggests a method (effectiveness study).
Computers are very useful in education.	No- It's a general opinion, not a research plan. It lacks depth, focus, and research potential.
My research will examine whether online coding platforms like Codecademy improve the problem-solving skills of high school students.	Yes—presents a clear hypothesis and identifies a measurable outcome (problem-solving skills) and a target group
Technology is advancing quickly these days.	No—too vague and cannot be turned into a structured research project without more detail.

a statement to research proposal- How to transform it?

'Technology is advancing quickly these days'

a statement to research proposal- How to transform it?

'Technology is advancing quickly these days'

"This study aims to investigate how rapid technological advancements impact teaching strategies in secondary schools."

"This research will explore how the fast pace of technological advancement affects employee adaptability in IT companies."

What was added here to make it as a proposal?

"The study will assess how the recent advancements in artificial intelligence have influenced productivity in software development."

a statement to research proposal- How to transform it?

‘Technology is advancing quickly these days’

“This study aims to investigate how rapid technological advancements impact teaching strategies in secondary schools.”

“This research will explore how the fast pace of technological advancement affects employee adaptability in IT companies.”

Broad elements of research

“The study will assess how the recent advancements in artificial intelligence have influenced productivity in software development.”

General Topic + Specific Focus + Research Purpose = Research Proposal

Research Proposal

In your opinion, what are the elements of research proposal?



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elements of research

Question slide

proposal?
 In other words, what
are the tasks you will be doing to
do Research?



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proposal?
In other words, what
are the tasks you will be doing to

do Research?

data collection

plan, research & report references data analysis
topic selection
plan for research first select topic
in-depth research learning rl
comparing past data
identifying problems
cloud computing selecting topic feedback
report comparison and study reference tools used
resources
planning, collect data gathering interviewing
report search

RESULTS SLIDE



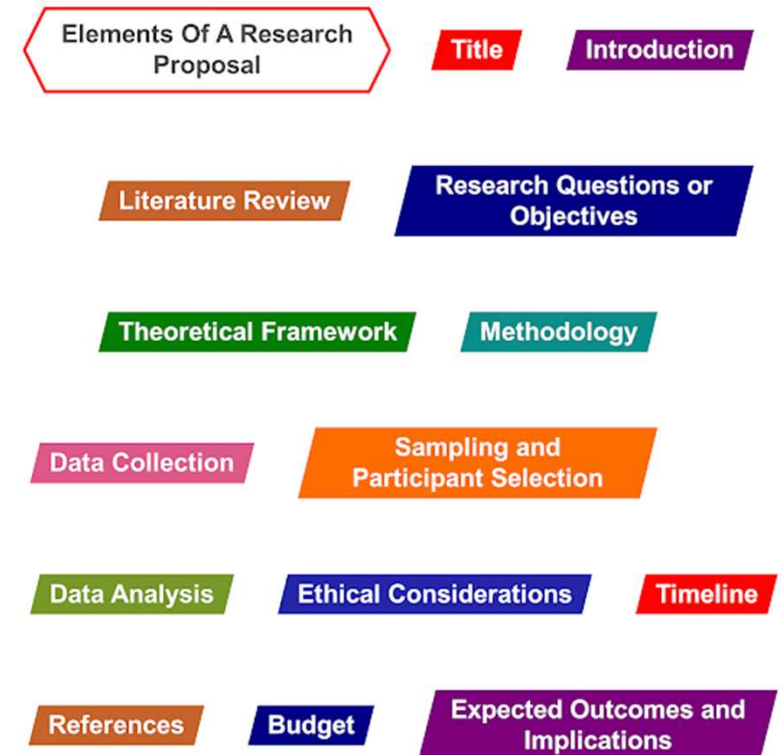
Research Proposal - Elements



Research Proposal - Elements

Proposal

- Title of research proposal
- Introduction
- Literature Review
- Research Problem statement
- Research Aim and objectives
- Research methodology
- Research contributions and outcomes
- Timeline
- References



Research Proposal - Elements

- **Title of research proposal**
- Introduction
- Literature Review
- Research Problem statement
- Research Aim and objectives
- Research methodology
- Research contributions and outcomes
- Timeline
- References

A good title is clear, specific, and informative. It should reflect the core idea of your research.

Example:

"Evaluating the Effectiveness of Machine Learning Algorithms for Real-Time Traffic Prediction"

Research Proposal - Elements

- Title of research proposal
- **Introduction**
- Literature Review
- Research Problem statement
- Research Aim and objectives
- Research methodology
- Research contributions and outcomes
- Timeline
- References

Gives background on the topic, introduces the main idea, and builds interest.

Example:

"With the rapid growth in urban traffic, real-time traffic prediction has become a critical challenge. Machine learning offers promising solutions..."

Research Proposal - Elements

- Title of research proposal
- Introduction
- **Literature Review**
- Research Problem statement
- Research Aim and objectives
- Research methodology
- Research contributions and outcomes
- Timeline
- References

A summary and critique of existing research. Shows what has already been done and identifies gaps.

Example:

"Smith et al. (2021) applied KNN to traffic datasets but struggled with real-time accuracy..."

Research Proposal - Elements

- Title of research proposal
- Introduction
- Literature Review
- **Research Problem statement**
- Research Aim and objectives
- Research methodology
- Research contributions and outcomes
- Timeline
- References

Clearly defines the **specific problem** your research will address.

Example:

"Existing traffic prediction models fail to adapt to real-time data streams, leading to inaccurate congestion forecasts."

Research Proposal - Elements

- Title of research proposal
- Introduction
- Literature Review
- Research Problem statement
- **Research Aim and objectives**
- Research methodology
- Research contributions and outcomes
- Timeline
- References

Aim: Broad goal

Objectives: Specific steps to achieve the aim

Aim: *To improve the accuracy of traffic prediction using deep learning.*

Objectives:

- To collect real-time traffic data
- To train and evaluate LSTM models
- To compare with existing models

Research Proposal - Elements

- Title of research proposal
- Introduction
- Literature Review
- Research Problem statement
- Research Aim and objectives
- **Research methodology**
- Research contributions and outcomes
- Timeline
- References

Describes how you will conduct the research: data collection, tools, analysis methods.

Example:

"Data will be collected using GPS APIs. LSTM models will be trained and evaluated using Python and TensorFlow."

Research Proposal - Elements

- Title of research proposal
- Introduction
- Literature Review
- Research Problem statement
- Research Aim and objectives
- Research methodology
- **Research contributions and outcomes**
- Timeline
- References

What new knowledge, tool, or solution will your research provide?

Example:

"This research will provide a scalable model for real-time traffic prediction with 15% improved accuracy over current systems."



Research Proposal - Elements

- Title of research proposal
- Introduction
- Literature Review
- Research Problem statement
- Research Aim and objectives
- Research methodology
- Research contributions and outcomes
- **Timeline**
- References

A realistic schedule of how you'll complete the research.

Example:

Phase	Activity	Duration
Phase 1	Literature Review	1 month
Phase 2	Data Collection	2 months
Phase 3	Model Development	2 months
Phase 4	Testing & Writing	2 months

Research Proposal - Elements

- Title of research proposal
- Introduction
- Literature Review
- Research Problem statement
- Research Aim and objectives
- Research methodology
- Research contributions and outcomes
- Timeline
- **References**

List all the sources you cited. Use a proper format like APA or IEEE.

Example:

Smith, J. (2021). *Deep Learning for Traffic Forecasting*. IEEE Transactions on ITS.

[1] J. Smith, "Deep learning for traffic forecasting," **IEEE Transactions on Intelligent Transportation Systems**, vol. 22, no. 4, pp. 1234–1245, Apr. 2021.

Research Proposal Elements- Quiz

Q1: Which of the following is the most appropriate title for a CS research proposal?

- A. Computers Are Helpful
- B. AI and Stuff
- C. Predicting Heart Disease Using Deep Learning Techniques
- D. Future of the World

Research Proposal Elements- Quiz

Q2: What should an introduction in a research proposal include?

- A. Personal opinions
- B. Background of the topic and research relevance
- C. Detailed budget
- D. Code samples

Research Proposal Elements- Quiz

Q3: Why is a literature review important?

- A. To copy previous work
- B. To show your writing skills
- C. To identify gaps in existing knowledge
- D. To avoid writing a methodology

Research Proposal Elements- Quiz

Q4: Which is a good research problem statement?

A. Traffic is bad.

B. I want to study AI.

C. Most traffic systems don't adapt to real-time changes, reducing accuracy.

D. Python is cool.

Research Proposal Elements- Quiz

Q5: What is the difference between aim and objective?

- A. Aim is specific; objectives are general
- B. Aim is about the title
- C. Aim is broad; objectives are detailed steps
- D. Aim and objective are the same

Research Proposal Elements- Quiz

Q6: What belongs in the methodology section?

- A. Bibliography
- B. Your favorite algorithm
- C. Data collection, tools, analysis techniques
- D. Pictures of your setup

Research Proposal Elements- Quiz

- Q7:** What is a valid expected outcome in a CS research proposal?
- A. I'll learn a lot.
 - B. An improved algorithm with better accuracy
 - C. More knowledge of Java
 - D. Proving AI is good

Research Proposal Elements- Quiz

Q8: Why include a timeline in a proposal?

- A. To show you love Gantt charts
- B. To waste space
- C. To plan how and when each research task will be completed
- D. To show off your design skills

Research Proposal Elements- Quiz

Q9: What is the purpose of references?

- A. To make the proposal longer
- B. To show off books
- C. To give credit and show background research
- D. To impress the reader

Group Activity: Evaluating Chapter 1 – Introduction

critically assess and understand what makes a strong research introduction by comparing the quality of writing, structure, and referencing.

Group Activity: Evaluating

Chapter 1 – Introduction

Sample #	Marks
1 and 2	Marks range from 29-35
3 and 4	Marks range from 18-24
5 and 6	Marks range from 8-12

Group Activity: Evaluating

Chapter 1 – Introduction

Sample #	Marks
1 and 2	Marks range from 29-35
3 and 4	Marks range from 18-24
5 and 6	Marks range from 8-12

- What differentiates the strong introductions from the weak ones in tone, structure, and referencing?
- Which sections (1.1–1.4) are most often weak in poor submissions?
- How do vague aims and objectives impact overall research quality?
- How can referencing and context-setting elevate writing quality?

Activity- From Research Idea to Proposal & Presentation

Objective:

By the end of this activity, you will be able to:

- Develop a structured **research proposal**
- Present the proposal using **professional PowerPoint slides**
- Understand how to apply research elements to a **real-world CS scenario**

Activity- From Research Idea to Proposal & Presentation

Scenario

"Smart cities are increasingly using IoT (Internet of Things) to collect real-time data for traffic, waste management, and energy consumption. However, many cities struggle to analyse and respond to data efficiently due to outdated systems and poor data integration."

As a computer science researcher, propose a solution using machine learning, cloud computing, or edge computing to improve smart city decision-making.

Activity- From Research Idea to Proposal & Presentation

Part 1: Research Proposal Writing

Instructions:

Write a 2–4 page research proposal based on the scenario above.

Your proposal must include:

1. Title
2. Introduction – Brief background on IoT and smart cities
3. Literature Review – Mention at least 3 relevant academic sources (IEEE, ACM, etc.)
4. Problem Statement – Clearly define the gap in current systems
5. Research Aim and Objectives
6. Methodology – Tools, data sources, approach (e.g., ML model, cloud architecture)
7. Expected Contributions – What your project will solve or improve
8. Timeline – Rough breakdown of project phases
9. References – In IEEE format

Activity- From Research Idea to Proposal & Presentation

Part 2: PowerPoint Presentation

Instructions:

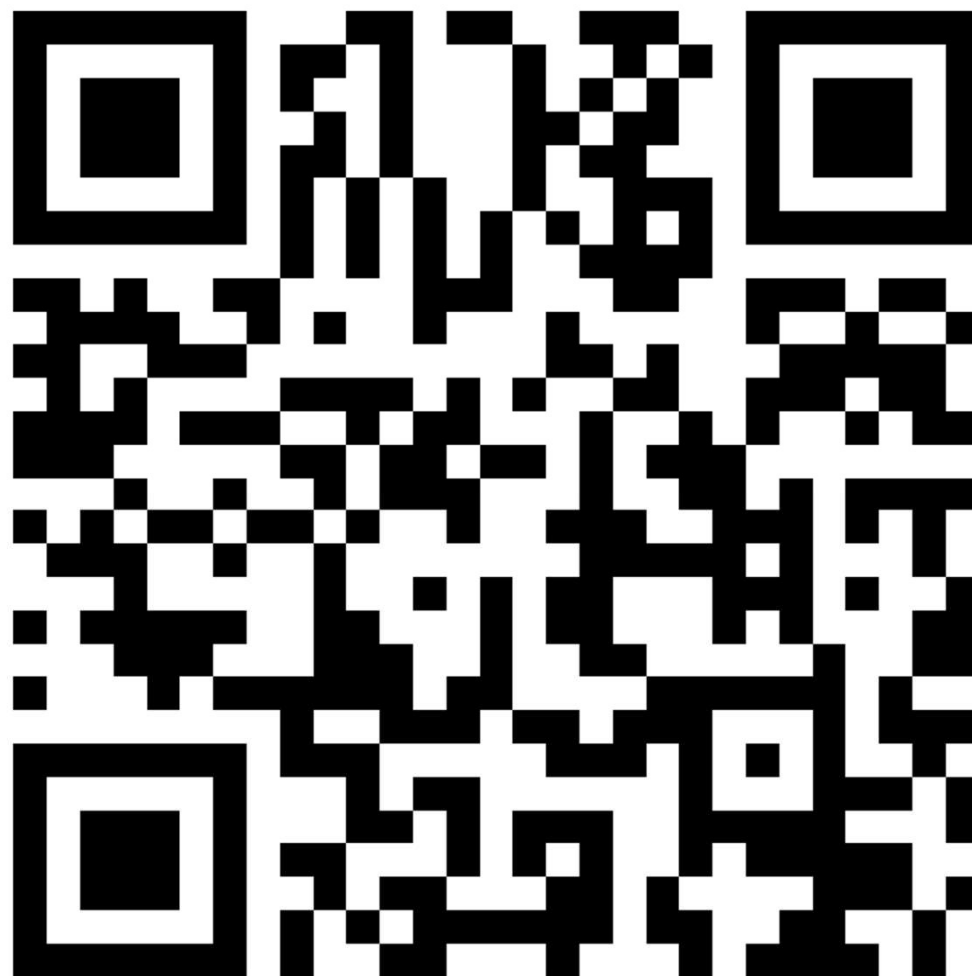
Prepare a 7–10 slide presentation based on your proposal. Your goal is to pitch your idea to a panel of reviewers (could be your classmates or instructors).

Your slide must include:

1. Title Slide – Your name, topic
2. Background / Introduction
3. Problem Statement
4. Aim & Objectives
5. Proposed Solution / Methodology
6. Expected Outcomes
7. Timeline (Gantt chart or simple table)
8. References (last slide)

Activity- From Research Idea to Proposal & Presentation

Submission point <https://forms.office.com/e/zdTKVgQv7H>



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Coming up

Research Proposal

- Getting ideas
- Introduction writeup structure
- Literature review