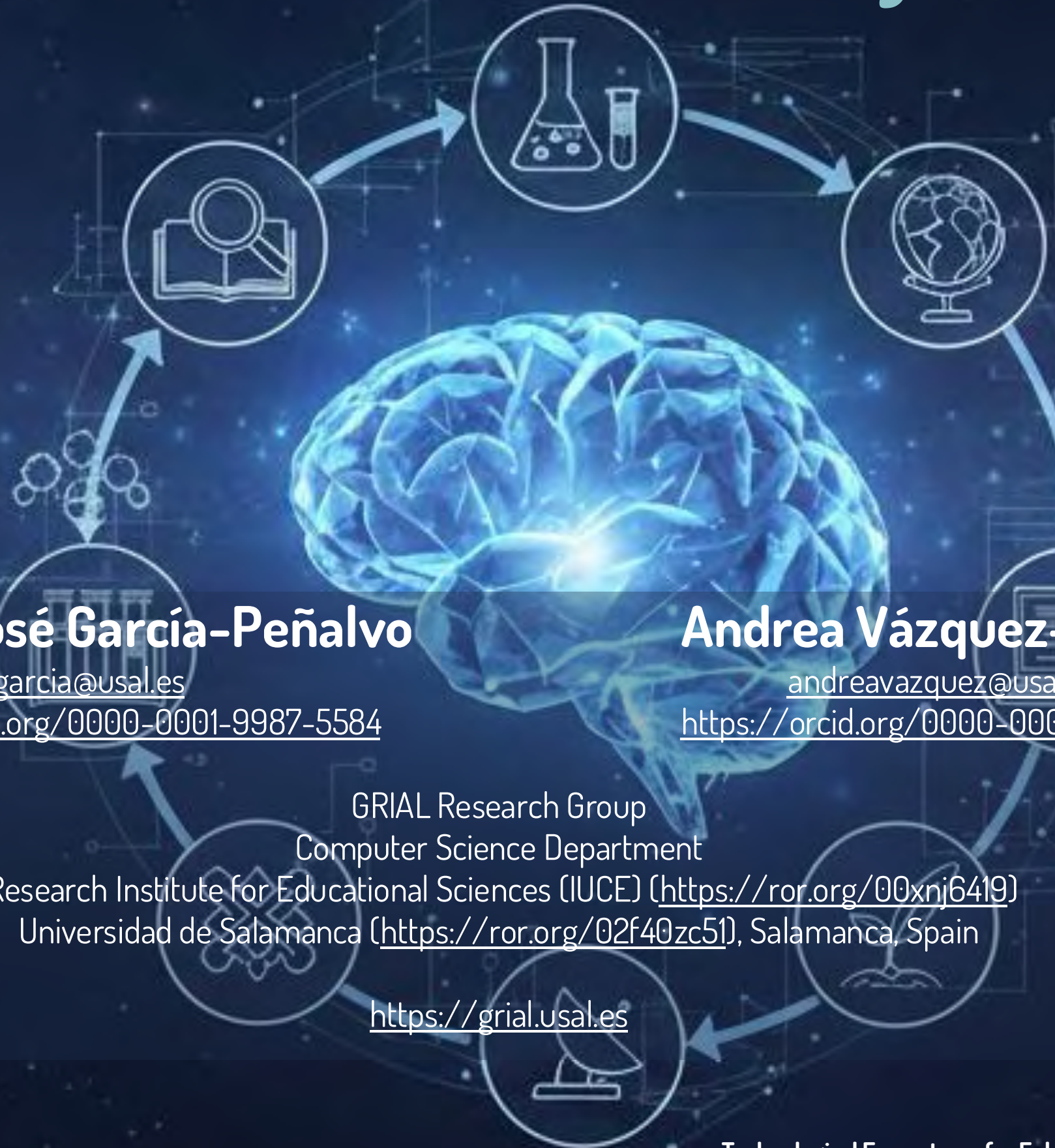


AI in the Research Lifecycle



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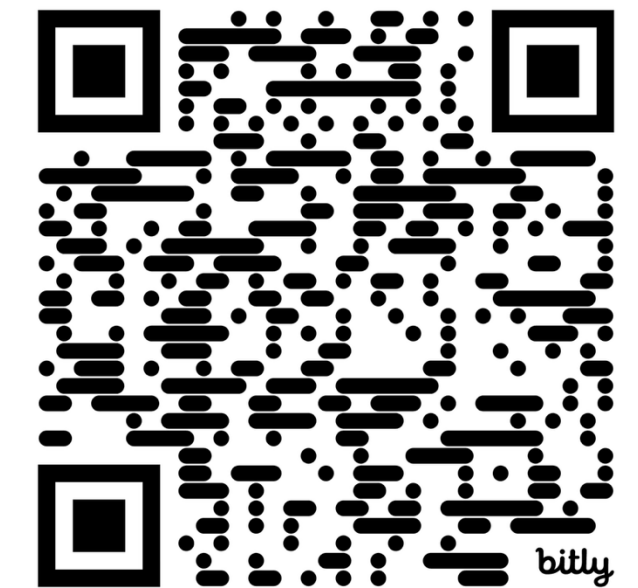
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<https://grial.usal.es>



Available at:

<https://bit.ly/49cRQOZ>



Main goal

Provide a critical and practical examination of generative AI across the research lifecycle, fostering ethical, well-informed, and productive research practices

Imagen generada con DALL·E 3 desde ChatGPT Plus

The AI branch driving today's technological disruption is generative AI [1]



Production of previously unseen synthetic content, in any form, and to support any task, through generative modeling [2]

It marks a turning point because it integrates into people's everyday lives, with the potential for a profound, possibly overwhelming, impact [3]



Imagen generada con DALL-E 3 desde ChatGPT Plus

We have expanded our vocabulary



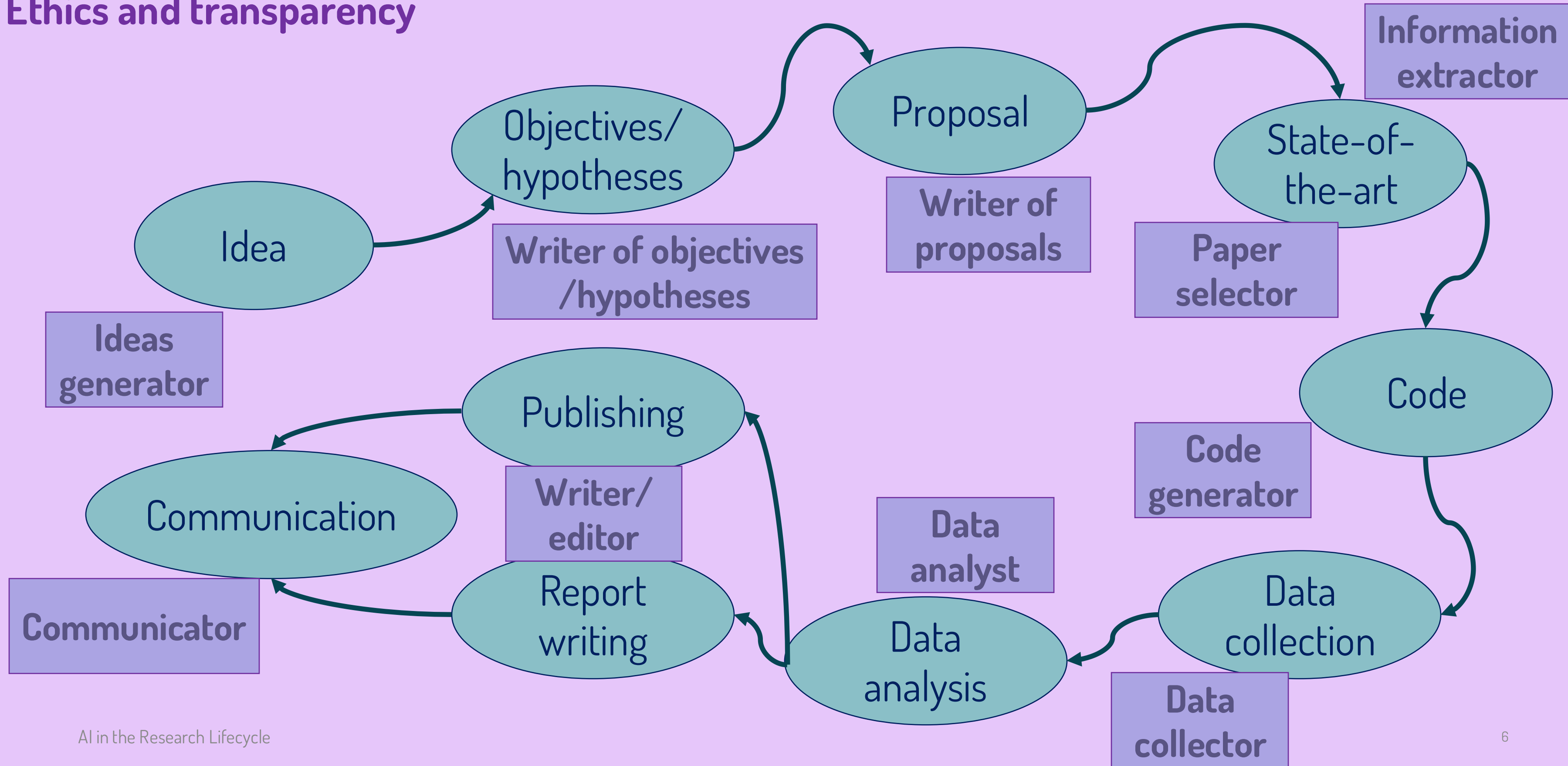
Regarding research...

- **The automatic generation of academic content in digital formats (text, images, video, presentations, audio, etc.) is already a reality**
- **These outputs are of sufficient quality to be used as research materials [4]**
- **The research and knowledge-transfer mission is not immune to hype and inaccuracies about AI, giving rise to myths and errors stemming from doomist perspectives, excessive optimism, and technological solutionism [5]**

Imagen generada con Gemini 2.5 Flash

The generative AI can assist at virtually any stage of an investigation [6]

Ethics and transparency



The users' AI toolbox

- Audio transcription
- Audio generation
- Image generation
- Video generation
- LLM-based chatbots
- LMM-based chatbots
 - Voice
 - Image
 - Text



Imagen generada con DALL-E 3 desde ChatGPT Plus

Text-based generative AI tools (some with multimodal capabilities)



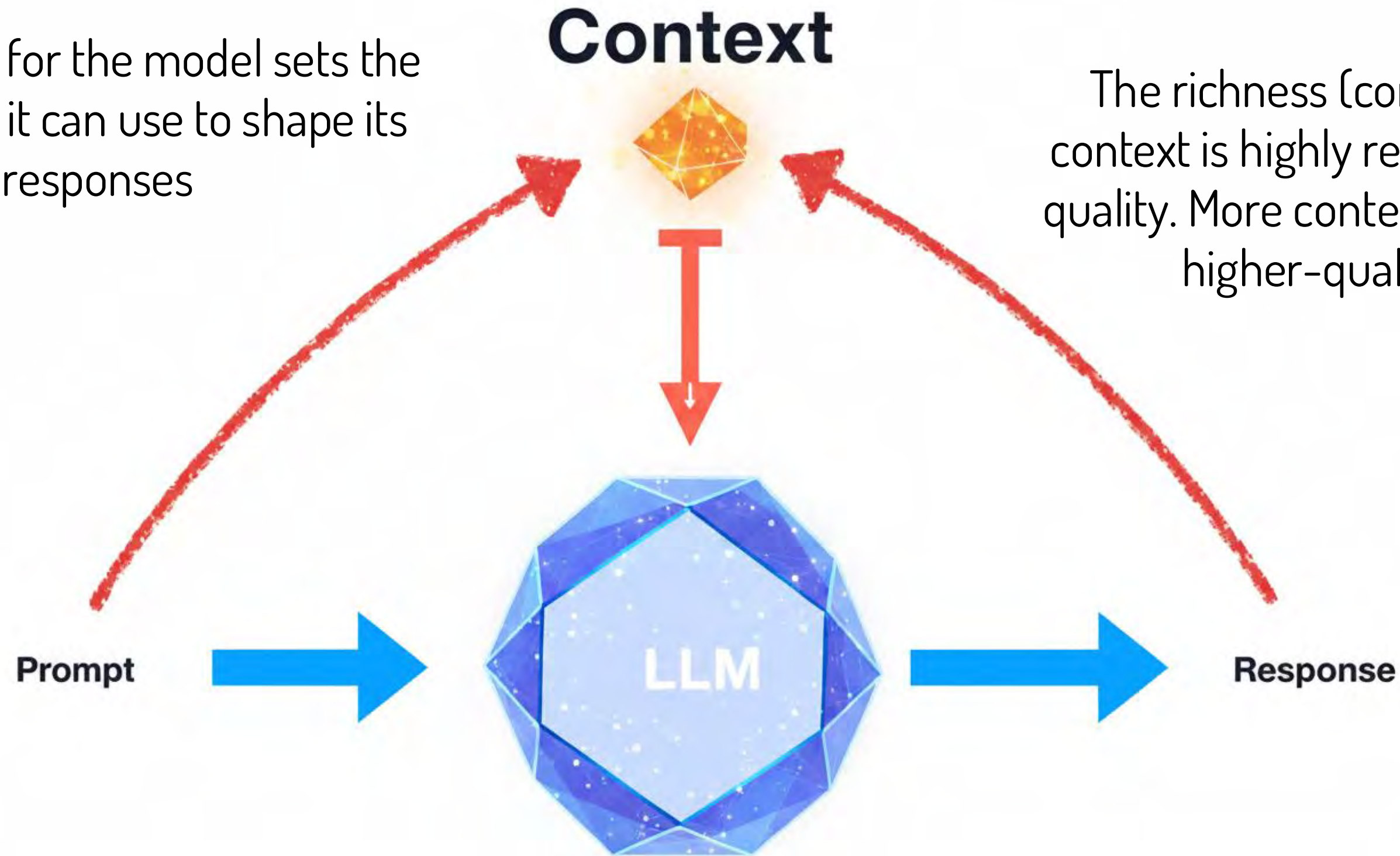
- ChatGPT - <https://openai.com/chatgpt>
- Gemini - <https://gemini.google.com>
- Google AI Studio - <https://aistudio.google.com/>
- Perplexity - <https://www.perplexity.ai>
- Comet - <https://www.perplexity.ai/comet>
- Claude - <https://claude.ai/>
- DeepSeek - <https://chat.deepseek.com/>
- Grok - <https://grok.com/>

In generative AI, the **prompt** and **context** are the basis for the quality of the **response**

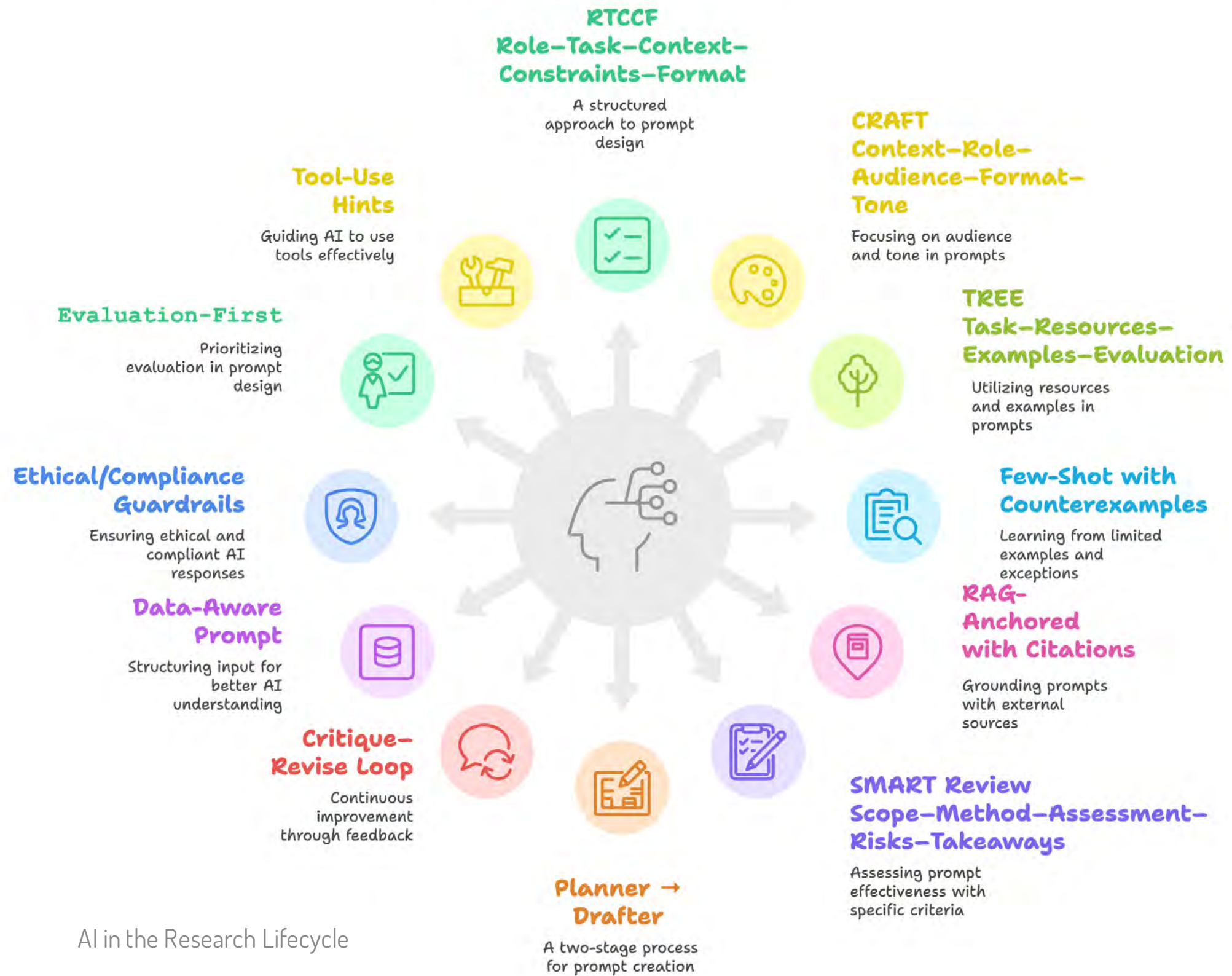


The context for the model sets the boundaries it can use to shape its responses

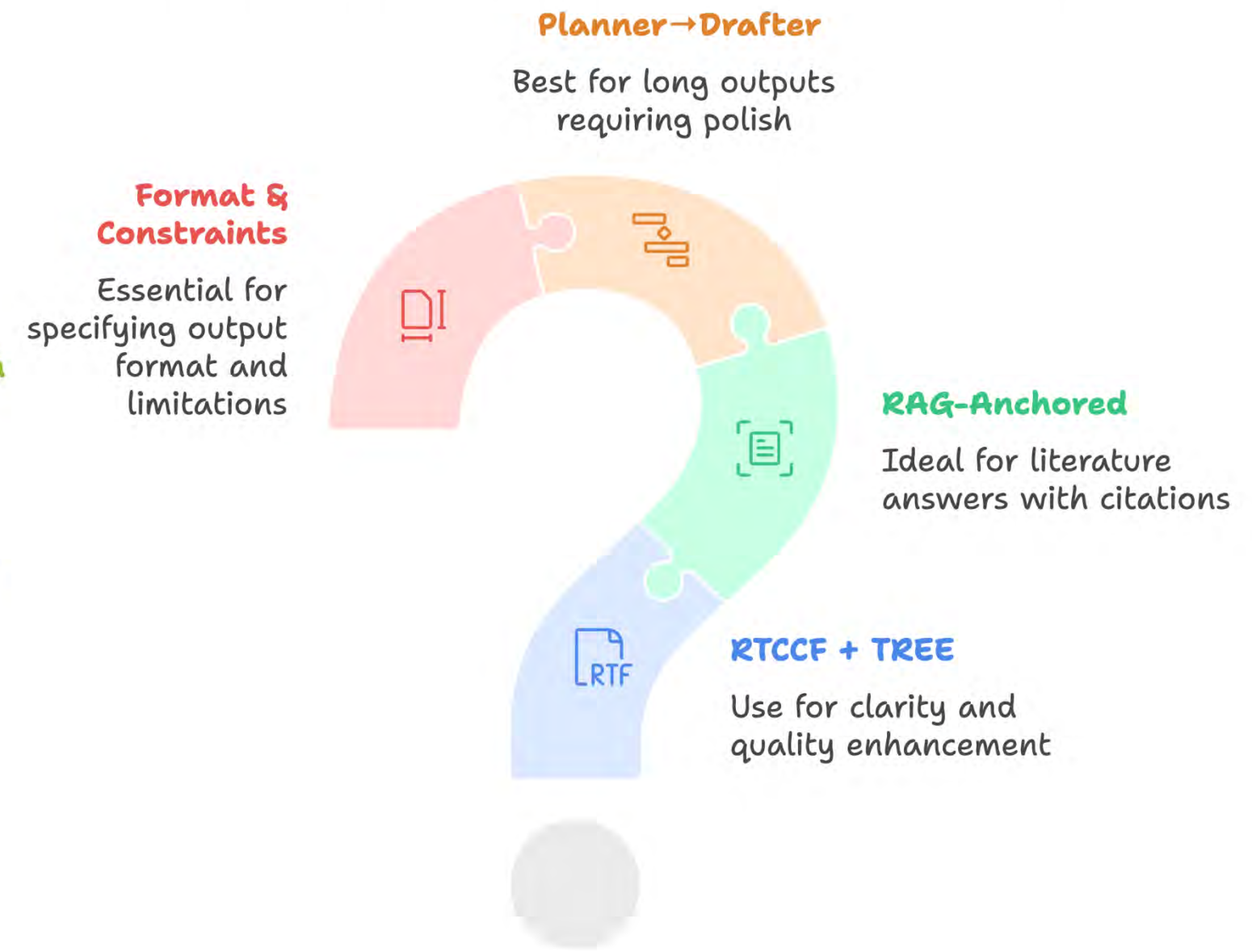
The richness (complexity) of that context is highly relevant to response quality. More context generally means higher-quality answers

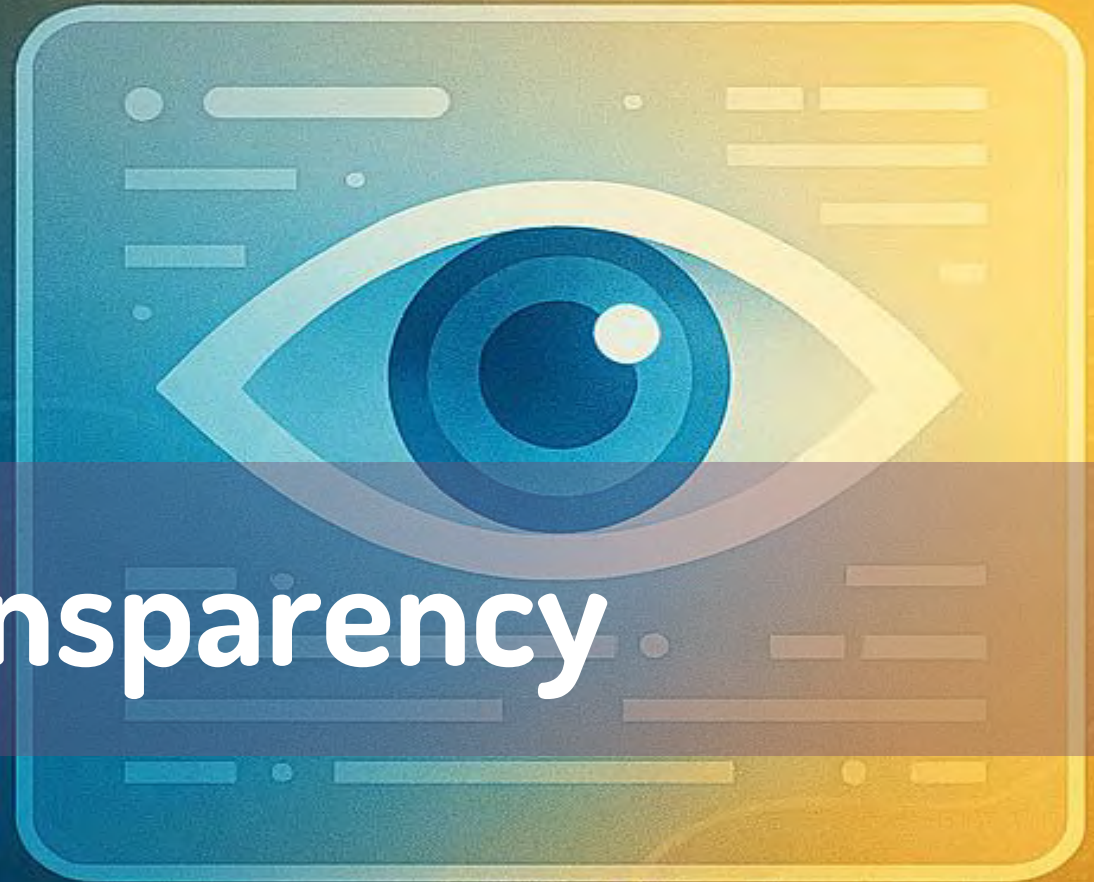


AI Prompting Strategies



Which prompt engineering scheme should be used?





Ethics and transparency



Principles for the responsible use of generative AI in research [7]



- **Reliability.** Involves aspects related to verifying and reproducing the information generated by AI for research purposes
- **Honesty.** Involves disclosing that generative AI has been used
- **Respect.** Involves the proper management of information, respect for privacy, confidentiality, and intellectual property rights, as well as accurate citation practices
- **Accountability.** Involves taking full responsibility for all research outputs, supported by the principle of human agency and oversight

Safe AI in Education Manifesto [8, 9]

Principle 1: Human oversight and accountability

Principle 2: Guaranteeing confidentiality

Principle 3: Alignment with educational strategies

Principle 4: Alignment with didactic practices

Principle 5: Accuracy and explainability

Principle 6: Comprehensive interface and behavior

Principle 7: Ethical training and transparency

<https://manifesto.safeaieducation.org>

Monash's guidance on AI acknowledgment

<https://d66z.short.gy/pMn84w>

An example of what an acknowledgement section could look like:

Part B: Concise summary of AI use in the assessment.

Very briefly explain the ways that you have used AI in the production of this assessment.

- Explain which AI tools you have used and for what purposes.
- If you have found and used tools on your own, explain why these tools were selected and provide a URL link to the tool.
- Note the number of iterations undertaken with each main AI collaborative tool.
- Describe what output from the tool/service has been included, and where.
- Summarise how you have altered, adopted, or built on the AI output.

In addition to using this summary to provide an overview of how AI has been used, it is strongly recommended that you also carefully document the processes undertaken in creating the assessment and to be able to present this process evidence upon request from educators or administrators.

A suggested format:

I used [insert AI system(s) and link] to [specific use of generative artificial intelligence] [number of iterations/drafts]. The tool was used to provide [describe content used in task]. The output from this tool was modified by [explain use].



Monash's guidance on AI acknowledgment

<https://d66z.short.gy/pMn84w>

EXAMPLE 1

EXAMPLE 2

EXAMPLE 3

EXAMPLE 4

I used AI in the following ways:

(i) generate ideas or structure suggestions, for assistance with understanding core concepts, or other substantial foundational and preparatory activity for the assessment.

I used Consensus (<https://consensus.app/search/>) and Scite (<https://scite.ai/>) to find relevant academic literature and ExplainPaper(<https://www.explainpaper.com/dashboard>) to help understand the arguments in the sources. I used GoodAI to create an outline (2 iterations)

(ii) generate text, rewrite, rephrase and/or paraphrase a portion of this assessment.

I used Microsoft Word with copilot assisting to prepare the essay drafts (4 iterations). I used GoodAI to help revise the introduction (3 iterations) and then ChatGPT3.5 (2 iterations) to make the introduction sound more academic. I further edited the introduction adding appropriate citations.

(iii) generate some other aspect of the submitted assessment.

I tried Microsoft Excel with copilot assisting to make the graphs but found GraphMaker (<https://www.graphmaker.ai/>) to produce better results for creating the graphs used as evidence in the essay. I used ChatGPT3.5 to change the bibliographic references into notes form for use in the footnotes.

Legend: [1] AI system(s); [2] link to the tool; [3] how the tool was used or prompts included; [4] output included in the task [5] edits and changes made to the output.

EXAMPLE 1

EXAMPLE 2

EXAMPLE 3

EXAMPLE 4

I acknowledge the use of [1] ChatGPT[2](<https://chat.openai.com/>) to [3] generate materials that were [4] included within my final assessment in modified form. I entered the following prompts on 4 January 2023:

- [3] Write a 50 word summary about the formation of Monash University. Write it in an academic style. Add references and quotations from Sir John Monash.

Legend: [1] AI system(s); [2] link to the tool; [3] how the tool was used or prompts included; [4] output included in the task [5] edits and changes made to the output.

EXAMPLE 1

EXAMPLE 2

EXAMPLE 3

EXAMPLE 4

I acknowledge the use of [1] ChatGPT [2] (<https://chat.openai.com/>) [3] to refine the academic language and accuracy of my own work. On 4 January 2023 I submitted my entire essay (link to google document here) with the instruction to "Improve the academic tone and accuracy of language, including grammatical structures, punctuation and vocabulary". [4] The output (here) [5] was then modified further to better represent my own tone and style of writing.

Legend: [1] AI system(s); [2] link to the tool; [3] how the tool was used or prompts included; [4] output included in the task [5] edits and changes made to the output.

EXAMPLE 1

EXAMPLE 2

EXAMPLE 3

EXAMPLE 4

If AI was permitted to be used in your assessment, but you have chosen *not* to use it, the following disclosure is recommended.

No content generated by AI technologies has been used in this assessment.



Ideas definition

Problem mapping + generative AI

Goal: Detect social, scientific, or technological challenges that could be addressed through a research project

Example

Could you please explore and explain to me the call 'Generative AI for Cybersecurity applications' (HORIZON-CL3-2025-02-CS-ECCC-01) (<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl3-2025-02-cs-eccc-01>)? Propose to me three possible project proposals, including the title, main objective, three specific objectives, and the most outstanding contributions. Finally, visualize a mental mind with the proposals' summary



Could you please explore and explain to me the call 'Generative AI for Cybersecurity applications' (HORIZON-CL3-2025-02-CS-ECCC-01) (https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl3-2025-02-cs-eccc-01)? Propose to me three possible project proposals, including the title, main objective, three specific objectives, and the most outstanding contributions. Finally, visualize a mental mind with the proposals' summary

Pensó durante 34s >

Here's a concise tour of the call — then three ready-to-shape proposal ideas with objectives and standout contributions — and a simple mind-map to compare them.

Call at a glance (what matters for drafting)

- **Topic:** HORIZON-CL3-2025-02-CS-ECCC-01 — *Generative AI for Cybersecurity applications*. **Type:** Research & Innovation Action (RIA). **Implementing body:** ECCC. **Indicative EU contribution/project:** ~€12–14M. **Topic budget:** ~€40M. **Opening:** 12 Jun 2025. **Deadline:** 12 Nov 2025. Proposals must address at least one of two expected outcomes:
 (a) GenAI for monitoring, detection, response, and self-healing (incl. adversarial-AI threats), or (b) GenAI tools for continuous monitoring, compliance, and automated remediation (considering EU/national law, ethics & data protection). Eligibility is restricted to entities in MS/associated countries, with controls on non-eligible ownership. Projects are expected to align with EU frameworks (AI Act, NIS2, Cyber Resilience Act), prefer open-source where feasible, use EU data spaces/EOSC, and define clear KPIs. nkcs.bund.de +2
- The call sits under "Increased Cybersecurity"; the ECCC confirms the package and amounts. Centro Europeo d... +1

Three proposal concepts (titles, objectives, contributions)

1) GEN-SHIELD: Generative Co-Pilot for Advanced Threat & Anomaly Defence (Outcome a)

Main objective: Build a GenAI-driven SOC co-pilot that detects, explains, and reacts to emerging threats across IT/OT by learning normal behaviour and generating analyst-ready hypotheses, playbooks, and safe auto-responses.

Three specific objectives

1. **Foundation for cyber telemetry:** Pre-train/fine-tune GenAI on multi-modal cyber data (logs/flow/DNS/EDR/ICS signals), with strong adversarial robustness and red-team hardening.
2. **Explainable TDIR:** Generate human-readable rationales (attack paths, MITRE mappings), and propose containment steps with verifiable guardrails.
3. **Self-healing actions:** Integrate with SOAR to synthesize, test, and execute reversible micro-patches and configuration fixes under policy constraints.

Outstanding contributions

- **EU GenAI model weights** (security-tuned) + **open evaluation suite** for anomaly/threat generation and robustness tests. ↓

2) COMPLY-GEN: Continuous Compliance & Automated Remediation with GenAI (Outcome b)

Main objective: Deliver a GenAI system that continuously maps evidence to controls and generates audit, risk, and remediation artefacts aligned with NIS2, Cyber Resilience Act, and the AI Act, minimizing manual audit burden.

Three specific objectives

1. **Control mapping engine:** Use structured RAG over policies, asset inventories, SBOMs, incident records to generate live control-conformance status and risk narratives.
2. **Automated evidence ops:** Synthesize audit-ready artefacts (policy diffs, logs, test runs), and continuous control validation pipelines.
3. **Policy-safe fix generation:** Propose and stage remediations (e.g., hardening scripts, IaC diffs) with traceable approval workflows.

Outstanding contributions

- **Open control-mapping taxonomy** for NIS2/CRA/AI-Act and **evidence schemas** for EU audits.
- **Benchmarks** for "compliance answer quality" (factuality, traceability) and **safe remediation** acceptance rates.
- **Reusable connectors** to EU data spaces/EOSC for compliance evidence.
(Directly targets continuous monitoring, compliance, and automated mitigation required by the call.) nkcs.bund.de

3) MALREV-GPT: Generative Malware Reverse-Engineering & Threat Intelligence (Outcome a, with b hooks)

Main objective: Create GenAI tools that deobfuscate, emulate, and summarise malware/code-artifacts at scale, producing shareable TI and YARA/Sigma rules with provenance and legal/ethical safeguards.

Three specific objectives

1. **Gen decompilation & emulation:** Generate function-level summaries, IOCs, and likely C2 behaviours; produce rule drafts and hunt queries for SIEM/XDR.
2. **Synthetic data & red-teaming:** Generate realistic but safe malware variants for defender training and detector stress-tests; include watermarking to avoid misuse.
3. **TI co-production with CSIRTs/LEAs:** Build workflows for cross-border sharing (formats: STIX/TAXII), with automated policy reviews and IP handling.

Outstanding contributions

- **EU malware-TI open datasets** (properly licensed/redacted) + **stress-test harness** for detectors.
- **Explainability pack** linking rules to code paths; **provenance/usage controls** to mitigate dual-use risks.
- **KPIs:** analyst hours saved/case; quality of generated rules; TTP coverage uplift. nkcs.bund.de

Why these three are the call

- They cleanly cover both (a) threat/anomaly detection/self-healing and (b) continuous compliance/automated remediation, as requested.
- They align with ECCC priorities, RIA scale (€12–14M), and the €40M topic envelope. They also incorporate EU-law alignment (AI Act, NIS2, CRA), open-source preference where feasible, EU data usage, and measurable KPIs — all explicitly called out. nkcs.bund.de +2



Quick mind-map (text)

yaml

 Copiar código

```
HORIZON-CL3-2025-02-CS-ECCC-01 (GenAI for Cybersecurity)
├── GEN-SHIELD (Outcome a)
│   ├── Goal: GenAI SOC co-pilot for detection+explanation+response
│   ├── Obj1: Robust multi-modal pretraining + adversarial hardening
│   ├── Obj2: Explainable TDIR (MITRE mapping, playbooks)
│   └── Obj3: Safe self-healing via SOAR
├── COMPLY-GEN (Outcome b)
│   ├── Goal: Continuous compliance & automated remediation (NIS2/CRA/AI Act)
│   ├── Obj1: Control-mapping RAG over org evidence
│   ├── Obj2: Auto evidence ops & live conformance views
│   └── Obj3: Policy-safe fix generation (IaC/scripts)
└── MALREV-GPT (Outcome a + b)
    ├── Goal: Gen malware RE → TI rules & hunts
    ├── Obj1: Generative decompile/emulate + IOC/rule drafts
    ├── Obj2: Synthetic datasets & defender stress-tests
    └── Obj3: STIX/TAXII sharing with governance
```

Handy factual references

- ECCC announcement of 2025 calls; confirmation of opening (12 Jun 2025) and package context.
Centra Europeo d...
- Topic budget & type, and typical contribution per project (€12–14M); overall Increased Cybersecurity envelope. nkcs.bund.de
- National portals summarising the topic and dates (opening 12 Jun 2025; deadline 12 Nov 2025).
nkcs.bund.de +1
- Official/derived topic wording (expected outcomes a/b; scope; legal/ethical alignment; EU-only participation & foreign-control limits; KPIs; open-source/EU data spaces). nkcs.bund.de

If you'd like, I can adapt any of the three into a **one-page concept note** with partners, TRLs, WP breakdown, budget sketch, and KPIs tailored to your context.

Definition of objectives and hypotheses



Brainstorming with AI (*brainwriting + prompting*)

Goal: Generate innovative hypotheses based on general topics

Example

Please, develop a formal structure for the MALREV-GPT project proposal. Follow this scheme:

- 1. Title*
- 2. Research questions (3-4)*
- 3. Hypotheses*
- 4. Main objective*
- 5. Specific objectives*

After that, give me a mermaid code for a logic flow that identifies the main goal, the specific goals, connects the goals with the research questions, and connects the research questions with the hypotheses



Please, develop a formal structure for the MALREV-GPT project proposal. Follow this scheme:

1. Title
2. Research questions (3-4)
3. Hypotheses
4. Main objective
5. Specific objectives

After that, give me a mermaid code for a logic flow that identifies the main goal, the specific goals, connects the goals with the research questions, and connects the research questions with the hypotheses

Pensó durante 15s >

Great—here's a crisp, formal skeleton you can paste into a template and expand with partners and WPs.

1) Title

MALREV-GPT: Generative Malware Reverse-Engineering & Threat Intelligence for Automated, Explainable Defences

2) Research questions (RQs)

- **RQ1. Faithfulness.** To what extent can generative models produce *faithful and verifiable* behavioural summaries of malicious binaries/scripts across architectures, packers, and obfuscation levels?
- **RQ2. Detection artefacts.** Can generative models reliably draft high-quality **YARA/Sigma/Suricata** rules and hunt queries that maximise coverage while controlling false positives in diverse enterprise/OT contexts?
- **RQ3. Synthetic safety.** How effective—and safe—is the use of *synthetically generated* malware variants for defender training and detector stress-testing without enabling misuse or model leakage?
- **RQ4. Governance & sharing.** How can we automate *provenance, legal/ethical review*, and cross-border **STIX/TAXII** sharing of generated intelligence at scale while preserving confidentiality and IP?

3) Hypotheses (Hs)

- **H1 (→ RQ1).** Instruction-tuned LLMs augmented with *IR/bytecode views, emulator traces, and AST/RCFG* features will achieve **≥0.80 faithfulness** (expert-rated) on behaviour summaries across at least three OS families.
- **H2 (→ RQ1).** Provenance-aware prompting (retrieval over code paths + taint flows) will reduce hallucinated behaviours by **≥40%** versus baseline LLM summaries.
- **H3 (→ RQ2).** Constrained generation with *spec-guided templates* plus *counterfactual unit tests* will yield rules whose median **precision ≥0.90** and **recall ≥0.75** on previously unseen samples.
- **H4 (→ RQ3).** Watermarked, policy-bounded generators can produce synthetic variants that lift detector robustness (**AUROC +5–8pp**) while keeping attack utility below a safety threshold (blocked by policy checks ≥99%).
- **H5 (→ RQ4).** A governance layer combining *signed provenance (e.g., SBOM-like manifests), PII/IP filters, and policy LLMs* will cut manual review time by **≥50%** while meeting EU legal/ethical constraints.

4) Main objective

To design, validate, and pilot a GenAI toolkit that **deobfuscates, emulates, and explains malware; auto-generates detection artefacts and safe synthetic variants; and operationalises provenance-aware, EU-compliant sharing of threat intelligence for CSIRTs, LEAs, and critical-infrastructure operators.**

5) Specific objectives (SOs)

- **SO1 — Generative RE & Explainability.** Build models that summarise malware behaviour from binaries/scripts using multi-view signals (IR, traces, graphs) with *chain-of-evidence* explanations and verifiable citations to code paths.
- **SO2 — Detector Artefact Synthesis & Verification.** Generate **YARA/Sigma/Suricata** rules and SIEM/XDR hunts; compile them into *testable bundles* with unit tests, canary sets, and continuous regression scoring.
- **SO3 — Safe Synthetic Data & Stress-Testing.** Create *watermarked, policy-constrained* malware variants and benign confounders; release a **stress-test harness** and red-teaming protocols for defenders.
- **SO4 — Governance, Safety & Compliance.** Implement *provenance, IP/PII scrubbing, dual-use risk controls*, and automated **STIX/TAXII** packaging with legal/ethical policy checks aligned to EU frameworks.
- **SO5 — Integration & Pilots.** Integrate with SOC tooling (SIEM/XDR/SOAR); run multi-site pilots (IT/OT) with KPIs on analyst time saved, rule quality, coverage uplift, and incident handling (MTTD/MTTR).



Mermaid logic flow (goal ⇌ objectives ⇌ RQs ⇌ hypotheses)

```
mermaid

flowchart TD
  %% Nodes
  G[Main Goal: GenAI toolkit for malware RE, artefact generation, safe sharing]

  subgraph Specific Objectives
    S1[S01: Generative RE & Explainability]
    S2[S02: Artefact Synthesis & Verification]
    S3[S03: Safe Synthetic Data & Stress-Testing]
    S4[S04: Governance, Safety & Compliance]
    S5[S05: Integration & Pilots]
  end

  subgraph Research Questions
    R1[R01: Faithful behavioural summaries across obfuscations]
    R2[R02: High-quality YARA/Sigma/Suricata with low FP]
    R3[R03: Safe & effective synthetic variants]
    R4[R04: Automated provenance & STIX/TAXII sharing]
  end

  subgraph Hypotheses
    H1[H1: Multi-view LLMs achieve ≥0.80 faithfulness]
    H2[H2: Provenance-aware prompting ↓ hallucinations ≥40%]
    H3[H3: Constrained gen rules reach P≥0.90 / R≥0.75]
    H4[H4: Watermarked generators boost AUROC +5-8pp, safe use]
    H5[H5: Governance layer halves review time, EU-compliant]
  end

  %% Edges: Goal → Specific Objectives
  G --> S1
  G --> S2
  G --> S3
  G --> S4
  G --> S5

  %% Edges: Specific Objectives → Research Questions
  S1 --> R1
  S2 --> R2
  S3 --> R3
  S4 --> R4
  %% Pilots touch multiple RQs by validation
  S5 --> R1
  S5 --> R2
  S5 --> R4

  %% Edges: Research Questions → Hypotheses
  R1 --> H1
  R1 --> H2
  R2 --> H3
  R3 --> H4
  R4 --> H5
```

Copiar código



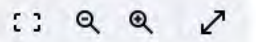
Click Copy and paste it into a Mermaid viewer, for example, <https://mermaid.live/>



Replace ChatGPT Pro, Mermaid.live, and Lucid Chart with Mermaid Chart [Try now](#)



Share [Save diagram](#)



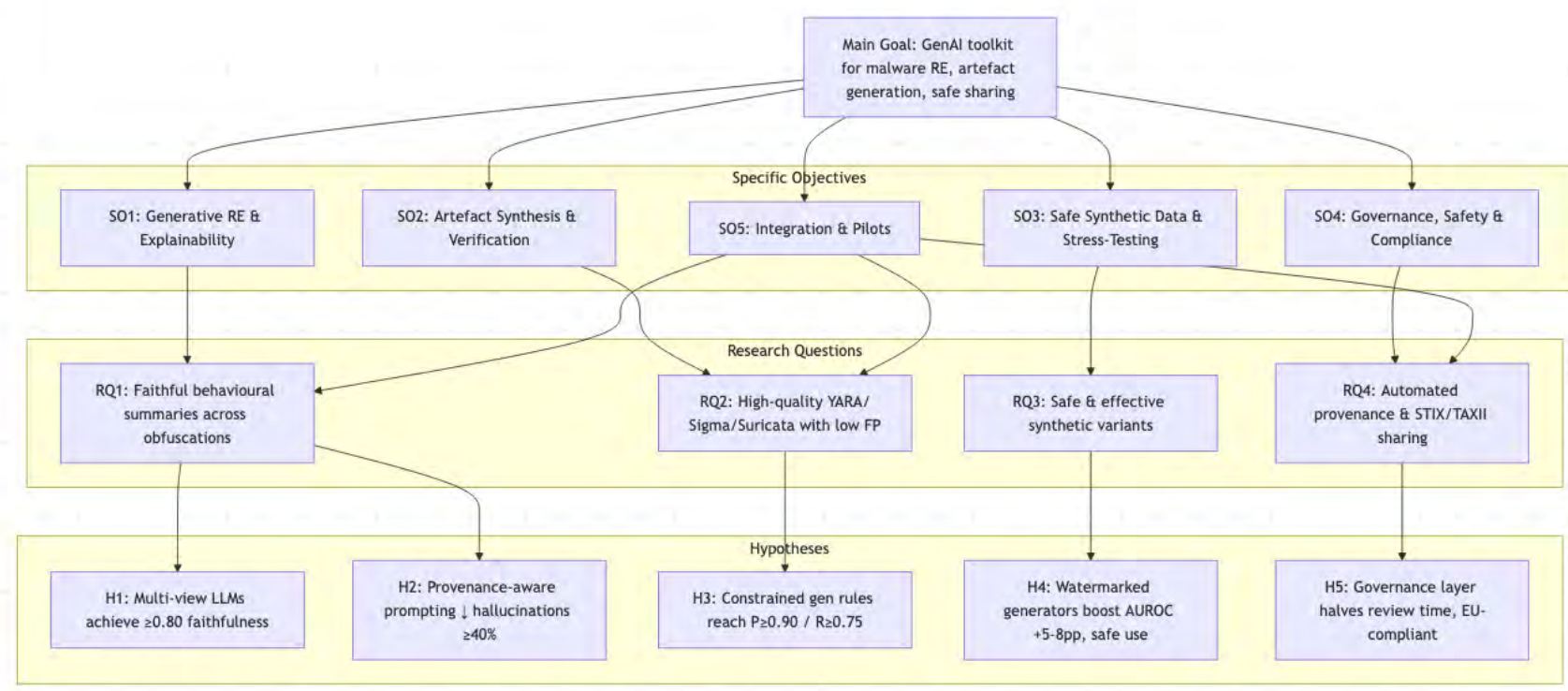
Mermaid Live Editor Playground - more features, no account required

Code Config Docs

```

1 flowchart TD
2   %% Nodes
3   G[Main Goal: GenAI toolkit for malware RE, artefact generation, safe sharing]
4
5   subgraph Specific Objectives
6     S1[S01: Generative RE & Explainability]
7     S2[S02: Artefact Synthesis & Verification]
8     S3[S03: Safe Synthetic Data & Stress-Testing]
9     S4[S04: Governance, Safety & Compliance]
10    S5[S05: Integration & Pilots]
11  end
12
13  subgraph Research Questions
14    R1[RQ1: Faithful behavioural summaries across obfuscations]
15    R2[RQ2: High-quality YARA/Sigma/Suricata with low FP]
16    R3[RQ3: Safe & effective synthetic variants]
17    R4[RQ4: Automated provenance & STIX/TAXII sharing]
18  end
19
20  subgraph Hypotheses
21    H1[H1: Multi-view LLMs achieve ≥0.80 faithfulness]
22    H2[H2: Provenance-aware prompting ↓ hallucinations ≥40%]
23    H3[H3: Constrained gen rules reach P≥0.90 / R≥0.75]
24    H4[H4: Watermarked generators boost AUROC +5-8pp, safe use]
25    H5[H5: Governance layer halves review time, EU-compliant]
26  end
27
28  %% Edges: Goal -> Specific Objectives
29  G --> S1
30  G --> S2
31  G --> S3
32  G --> S4
33  G --> S5
34
35  %% Edges: Specific Objectives -> Research Questions
36  S1 --> R1
37  S2 --> R2
38  S3 --> R3
39  S4 --> R4
40  %% Pilots touch multiple RQs by validation
41  S5 --> R1
42  S5 --> R2
43  S5 --> R4
44
45  %% Edges: Research Questions -> Hypotheses
46  R1 --> H1
47  R1 --> H2
48  R2 --> H3
49  R3 --> H4
50  R4 --> H5
51

```



Working with research proposals

Pitch + AI feedback

Goal: Synthesize and clearly communicate the research proposal and obtain reasoned feedback

Example

The research proposal "Visual analytics and machine learning for decision making in health ecosystems (AVisSA)" has been developed. The following is a summary designed to synthesize and communicate its objectives, with the aim of improving the proposal and how its mission is communicated to society

"The AVisSA project proposes an innovative solution to the challenge of effectively leveraging large volumes of heterogeneous data within health technology ecosystems. The core problem identified is that current decision support systems lack adaptability, scalability, and personalization, particularly in contexts such as social and healthcare services, where the constant evolution of stakeholders and services necessitates flexible and robust solutions.

The proposal focuses on developing a system for the automatic generation of personalized dashboards, applying techniques from domain engineering, meta-modeling, and machine learning. These dashboards will not only display key performance indicators for different user profiles (e.g., physicians, managers, caregivers) but will also be capable of adapting to structural changes in the ecosystem and to the user's profile. Privacy will also be addressed through GDPR-compliant anonymization techniques.

The project is at a TRL 3-4 and includes a progressive validation plan: from laboratory usability tests to real-world implementation in two distinct use cases—a social and healthcare environment (TE-CUIDA) and the monitoring of medical imaging tests. Through a mixed-methods evaluation approach, both the user experience and the system's adaptive capabilities will be assessed. Furthermore, the project includes plans for the commercial exploitation of the 'meta-dashboard' and the development of simulators with machine learning and learning analytics capabilities.

The AVisSA solution is aligned with European challenges in health and aging and represents a substantial advancement over the state-of-the-art in software engineering applied to digital health."

Take on the role of a scientific committee to:

- Evaluate the proposal*
- Identify strengths and weaknesses*
- Make suggestions to strengthen the message*

The research proposal "Visual analytics and machine learning for decision making in health ecosystems (AVisSA)" has been developed. The following is a...



Ver razonamiento

Of course. Here is an evaluation of the "AVisSA" research proposal from the perspective of a scientific committee, including its strengths, weaknesses, and concrete suggestions for improving its message.

Overall Evaluation

The AVisSA project presents a timely, ambitious, and highly relevant proposal. It addresses a critical bottleneck in modern healthcare: the effective utilization of vast and diverse data for decision-making. The core concept of an adaptive "meta-dashboard" is innovative and tackles the fundamental limitations of static decision support systems. The proposal is well-structured, demonstrating a clear understanding of the problem, a robust methodological plan, and a forward-looking vision for validation and exploitation.

Strengths

- **Problem Significance:** The proposal correctly identifies a major challenge in digital health—the lack of scalable and adaptable tools for data analysis in complex, evolving ecosystems. This aligns directly with pressing national and European priorities in health and active aging.
- **Innovative Approach:** The core idea of using domain engineering and meta-modeling to **automatically generate** personalized dashboards is a significant advancement over the state-of-the-art. This shifts the paradigm from creating individual dashboards to creating a system that *builds* dashboards, which is inherently more scalable and future-proof.
- **Robust Validation Plan:** The phased validation, moving from laboratory testing (TRL 3-4) to two distinct, real-world use cases (social care and medical imaging), is a major strength. This dual-case approach will rigorously test the system's adaptability and generalizability.
- **Holistic Scope:** The project considers the full lifecycle: technical development (ML, meta-modeling), user-centric evaluation (usability, mixed-methods), ethical considerations (GDPR), and commercial planning. This demonstrates a mature and comprehensive vision.

Weaknesses

- **Clarity of Mechanism:** While the proposal mentions "meta-modeling" and "machine learning," the summary lacks a clear, simple explanation of **how these components interact** to achieve adaptation. It's unclear if machine learning is used to suggest KPIs, adapt the visual layout, or predict user needs. The synergy between the components could be more explicitly stated.
- **Ambition vs. Feasibility:** The project is highly ambitious. Integrating domain engineering, meta-modeling, advanced ML, and user-profile adaptation is a complex undertaking. The proposal would be stronger if it more clearly acknowledged the primary technical risks and the mitigation strategies in place.
- **Measuring Impact:** The proposal aims to improve "decision-making." This is a notoriously difficult outcome to measure. The summary does not specify the key metrics that will be used to prove that the AVisSA system leads to objectively **better, faster, or more efficient decisions**, beyond user satisfaction.
- **Potential for Jargon:** The current summary, while technically sound, relies on specialized terms (e.g., "heterogeneous data," "meta-modeling"). This can make it less accessible to a broader audience, including policymakers, potential investors, or the general public.



Suggestions to Strengthen the Message

To improve how the project's mission is communicated, we recommend focusing on clarity, impact, and human-centric language.

1. Lead with the Human Problem, Not the Technology

Instead of starting with the technical challenge, begin with the human story. Frame the problem from the perspective of the end-user.

- **Current:** "The AVisSA project proposes an innovative solution to the challenge of effectively leveraging large volumes of heterogeneous data..."
- **Suggested:** "Every day, healthcare professionals like doctors, clinic managers, and caregivers are overwhelmed by a flood of data from different sources. Finding the right information at the right time is a major challenge that can delay critical decisions. **AVisSA is being built to solve this.**"

2. Simplify the Core Innovation with an Analogy

The "meta-dashboard" is the key innovation, but the term is abstract. Use an analogy to make it instantly understandable.

- **Suggestion:** "Think of current dashboards as a static, printed map. They're useful, but they don't change. **AVisSA is not a map; it's a personal GPS.** It understands who you are (your role), where you need to go (your goal), and automatically creates the best route (the data you need to see right now). If the road network changes (the health ecosystem evolves), our system instantly recalculates, ensuring you're never working with outdated information."

3. Translate Technical Features into User Benefits

Connect every technical component directly to a tangible benefit for the user or the healthcare system.

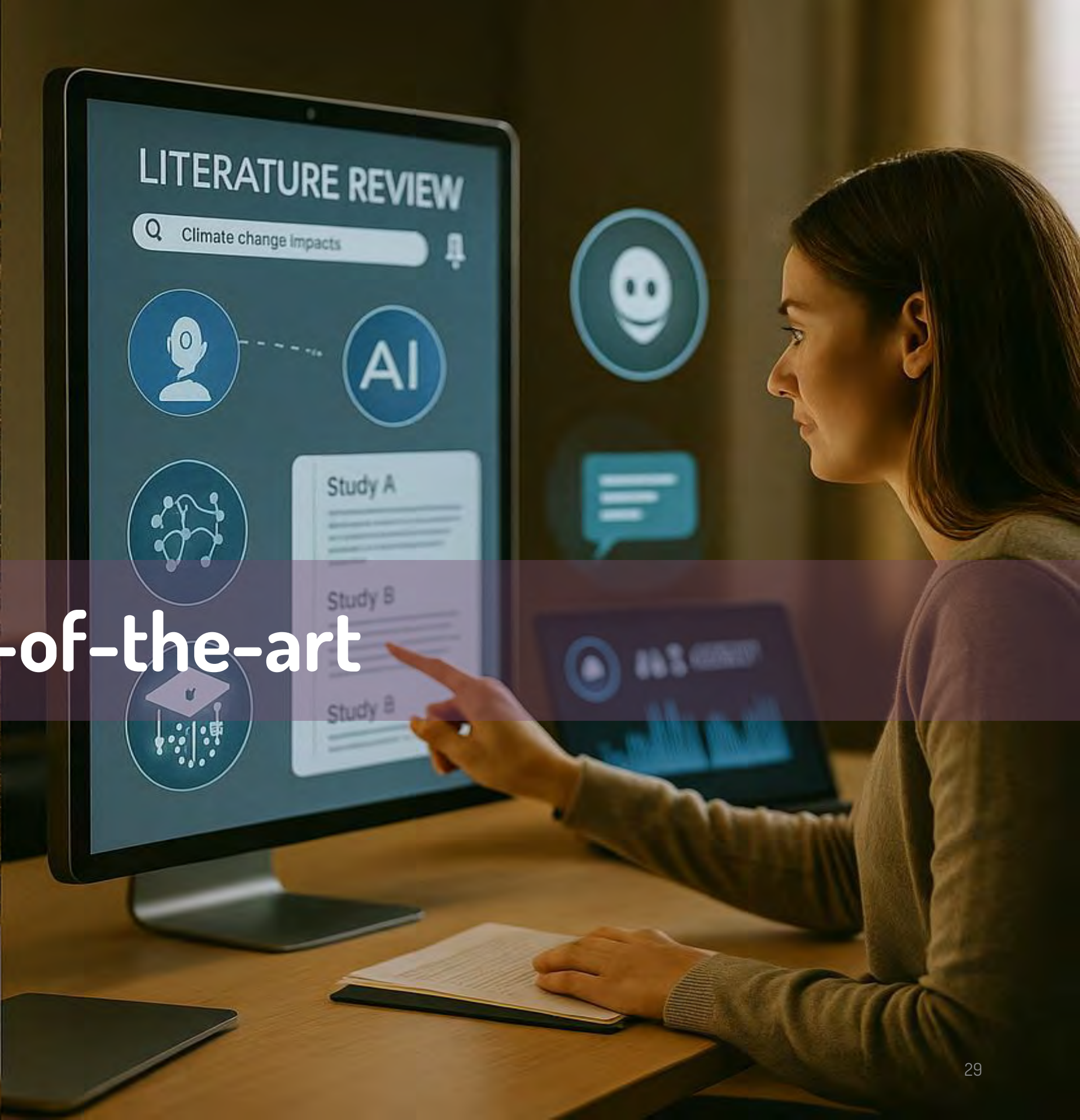
- Instead of "**Automatic generation of personalized dashboards,**" say "**Dashboards that build themselves for you.**"
- Instead of "**Adaptable to structural changes,**" say "**Future-proof and maintenance-free.** When your organization adds a new service or data source, AVisSA adapts automatically without needing expensive redevelopment."
- Instead of "**Applying machine learning,**" say "**Learning what matters to you.** Our system intelligently learns which information is most critical for your role, helping you focus on what's important and avoid data overload."

4. Quantify the "So What?"

Define the expected impact with concrete, even if aspirational, metrics. This makes the value proposition much more compelling.

- **Suggestion:** "Our goal is to demonstrate that AVisSA can:
 - **Reduce the time clinicians spend searching for information by up to 40%.**
 - **Help hospital managers identify operational bottlenecks 25% faster.**
 - **Improve user satisfaction with data tools by providing a truly personalized and intuitive experience.**"

By implementing these changes, the AVisSA proposal can transform from a strong technical document into a powerful and persuasive narrative that clearly communicates its transformative potential for healthcare.



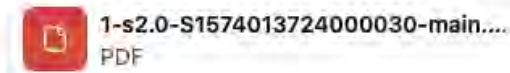
State-of-the-art

Interrogating a paper with AI

Goal: Test the AI's ability to retrieve key information from an article based on direct questions

Example

What is the main objective of the study? What type of sample or technique was used? What limitations does the study itself acknowledge?




What is the main objective of the study? What type of sample or technique was used? What limitations does the study itself acknowledge?



Pensó durante 30s

Here's a quick, evidence-based summary from the paper you shared:




Main objective

To conduct a **systematic literature review (2017–2023)** that *identifies, analyzes, and classifies* quantum machine learning (QML) algorithms and their applications (with attention to how they're implemented and evaluated).  1-s2.0-S1574013724000030-main

Sample / technique

- **Technique:** A **Systematic Literature Review** following Kitchenham's guidelines, with PICOC framing and a PRISMA-style process. Searches were run in IEEE Digital Library, Web of Science, ScienceDirect, and IBM Quantum Network Papers, using terms like "quantum machine learning," "quantum deep learning," and "quantum neural network*." Tools included Parsifal (traceability) and Mendeley (references).  1-s2.0-S1574013724000030-main
- **Sample:** From **5,497** initial records, screening and quality criteria reduced the set to **94 included articles** covering QML algorithms and applications.  1-s2.0-S1574013724000030-main

Limitations acknowledged by the study

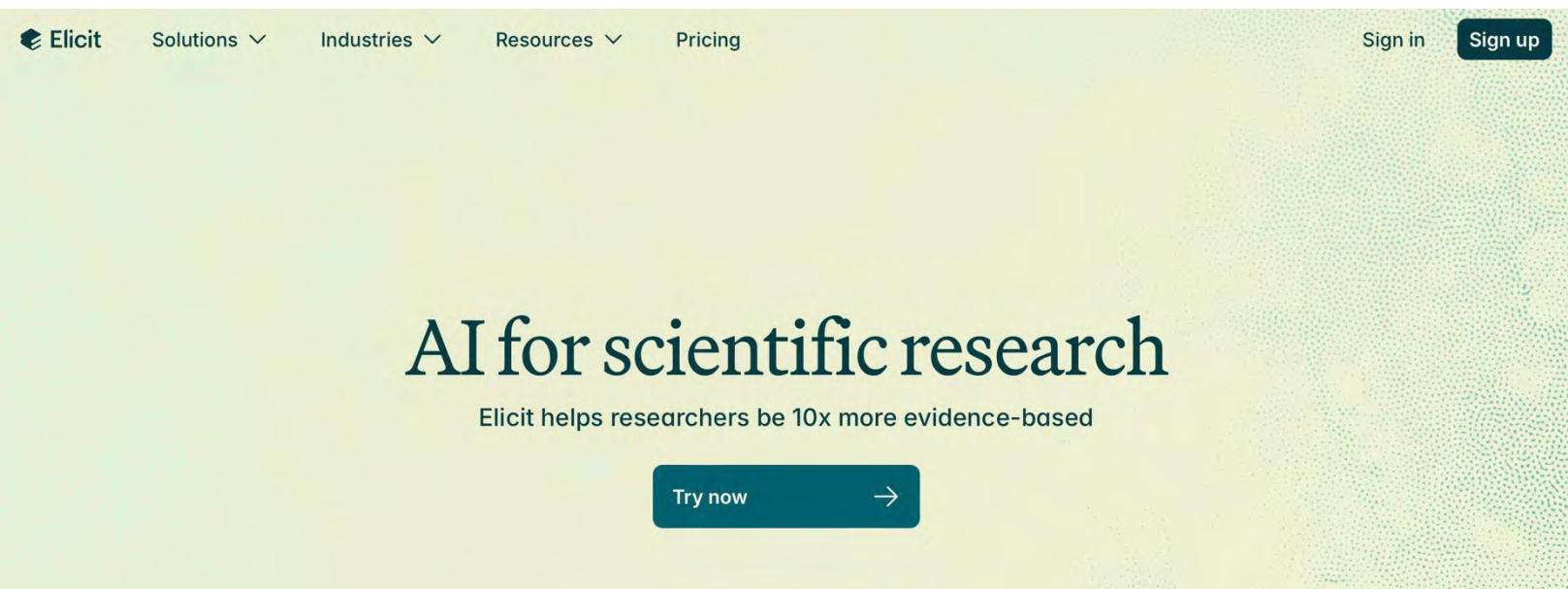
- **Threats to validity / bias:** The authors note potential bias from having the **first author as the primary reviewer**, mitigated by validation from the other two authors and a public repo of the process.  1-s2.0-S1574013724000030-main
- **Database coverage choices:** While major CS databases were used, they **added IBM Quantum Network Papers (not indexed)** to capture important QML work otherwise missing—this expands coverage but also introduces a different type of source.  1-s2.0-S1574013724000030-main
- **Search and selection constraints:** Reliance on **general search terms**, predefined **inclusion/exclusion and quality criteria**, and availability through **University of Salamanca licenses** may affect completeness; the team tried to counter this with transparent, reproducible procedures.  1-s2.0-S1574013724000030-main

If you want, I can extract the exact inclusion/exclusion and quality criteria as a checklist.

Fuentes



Elicit



- It is used to locate research results
- Assistant for asking questions
- Allows the management of complex queries that may require an in-depth exploration of existing literature
- Can extract and synthesize specific data from documents

<https://elicit.com/>

Elicit

Find papers



The screenshot shows the Elicit web interface. At the top left is the 'Elicit' logo. In the top right corner, there is a hamburger menu icon. Below the logo is a search bar with the placeholder text 'Find papers' and a search icon on the left and a dropdown arrow on the right. The main content area contains the text 'open research policies case studies'. Below this, a yellow dot is followed by the text 'More precise questions work better. Try adding elements like these:'. Underneath are three grey buttons: 'Specificity', 'Comparative approach', and 'Outcome focus'. A dark teal circular button with a white right-pointing arrow is positioned below these buttons. At the bottom right of the main content area, it says 'Searching: Research papers Clinical trials', with 'Research papers' highlighted in a light blue box. At the bottom of the interface, under the heading 'More tools', there are two rounded buttons: 'Upload and extract' with a document icon and 'Chat with papers' with a speech bubble icon.

Elicit

Find papers

The screenshot displays the Elicit search interface. At the top, there are navigation links for 'Recent', 'Library', and 'Alerts', along with an 'Upgrade' button and a user profile for Francisco García. The search bar contains the query 'open research policies case studies'. Below the search bar, there are controls for sorting (Most relevant), searching, filtering, and exporting. The main results table shows three papers, each with a checkbox, title, author, and summary. A sidebar on the right provides a summary of the selected papers, including a 'Summarize these papers' section with a 'Copy' button and a list of key insights.

<input type="checkbox"/>	Paper	20 found	Summary
<input type="checkbox"/>	<p>Implementing publisher policies that inform, support and encourage authors to share data: two case studies</p> <p>L. Jones, R. Grant, I. Hrynaszkiewicz</p> <p>Insights: The UKSG Journal, 2019, 27 citations</p> <p>Abstract only</p>		<p>Two case studies examine the experiences of Taylor & Francis and Springer Nature in implementing data-sharing policies to enhance transparency and reproducibility. *</p>
<input type="checkbox"/>	<p>Implementing Open Access Policy: First Case Studies</p> <p>Chris Armbruster</p> <p>2011, 3 citations</p> <p>Abstract only</p>		<ul style="list-style-type: none"> - Main finding: Provides a methodological standard for evaluating the first generation of open access policies. * - Strength of evidence: Based on a small number of case studies covering most pioneer institutions internationally. * - Methodology: Qualitative approach using public documents, background information, and interviews with professionals. *
<input type="checkbox"/>	<p>Implementing Open Access: Policy Case Studies</p> <p>Chris Armbruster</p>		<p>Open access policy implementation is challenging; * case studies of ten</p>

Chat with papers Edit columns

Summarize these papers Copy

Open research policy case studies reveal complex implementation challenges across multiple domains, with institutions and publishers gradually developing sophisticated approaches to openness.

The evidence spans multiple contexts: [Chris Armbruster et al., 2010](#) examined ten detailed cases worldwide, including institutional and national platforms like Queensland University of Technology and the Wellcome Trust. [L. Jones et al., 2019](#) specifically analyzed publisher experiences, noting increasing data-sharing policies aimed at research transparency.

Key insights include:

- Policy implementation typically requires several years to achieve significant progress
- Challenges include securing legitimate authority and sufficient resources
- Different disciplines and institutions approach openness uniquely

[A. Whyte et al., 2011](#) further highlighted that open science participation varies, recommending better support and guidelines. [Ben Catt et al., 2023](#) demonstrated ongoing

Elicit Research report



The screenshot shows the Elicit web interface. At the top, there is a navigation bar with the Elicit logo, "Recent", "Library", "Alerts", an "Upgrade" button, "Help", and a user profile for "Francisco García". Below the navigation bar, there are three tabs: "Research report" (selected), "Systematic review", and "Find papers". The main content area displays the title of a research report: "The Impact of AI-Powered Predictive Analytics on Risk Management Efficacy in Agile Software Development Projects". Below the title, there is a message: "Good research question. Consider adding these elements for better results:" followed by three buttons: "Specificity", "Measurable outcomes", and "Comparative design". At the bottom right of this section, there is a "Searching:" label and two buttons: "Research papers" (selected) and "Clinical trials".

This screenshot shows a modal dialog box titled "What kind of answer do you need?". The dialog asks the user to "Choose the level of rigor and speed that best suits your research question." and provides three options: "Fast" (Screen top 50 sources - Extract from up to 10 sources), "Balanced PLUS" (Screen top 500 sources - Extract from up to 25 sources), and "Comprehensive PLUS" (Screen top 500 sources - Extract from up to 40 sources). Below the options, there is a message: "We are going to use up to 10 source extractions from your remaining 20 in this billing cycle to generate this report." At the bottom of the dialog, there are three buttons: "Cancel", "Upgrade to Plus", and "Generate report".

Elicit Research report



Elicit Recent Library Alerts Upgrade Help Francisco García

AI in Agile Risk Management Research report View only Create alert Share

OCTOBER 17, 2025

The Impact of AI-Powered Predictive Analytics on Risk Management Efficacy in Agile Software Development Projects

AI-powered predictive analytics improve risk management efficacy in agile software development projects by delivering 94% risk identification accuracy, 35% faster threat detection, and 25% better risk mitigation effectiveness.

ABSTRACT

AI-powered predictive analytics have been shown to improve risk management in agile software development projects. * Almalki (2025) reports an 18% increase in sprint completion speed and a 94% risk identification accuracy using optimization frameworks and predictive analytics in agile settings. * Akpomedeaye et al. (2025) observe near-perfect risk classification accuracy with XGBoost and principal component analysis, while Kumari et al. (2025) present supportive precision and recall figures (precision up to 1.00, recall reaching 1.00) in real-time risk prediction. * Mahmud et al. (2025) note a 35% reduction in threat detection time alongside a 25% enhancement in risk mitigation effectiveness. *

Several studies detail the integration of AI tools with agile workflows, often through real-time dashboards or interfaces with tools such as Jira and Azure DevOps. * These systems yield benefits including continuous monitoring, actionable alerts, and improved decision support. * Reported

Report

- Status
- Gather sources (50 sources found) Details
- Screen sources (10 sources included) Details
- Extract data (70 data points extracted) Details
- Generate report Save PDF

Chat

Ask anything about the results



Elicit - AI in Agile Risk Ma...port.pdf

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Several studies detail the integration of AI tools with agile workflows, often through real-time dashboards or interfaces with tools such as Jira and Azure DevOps. These systems yield benefits including continuous monitoring, actionable alerts, and improved decision support. Reported limitations concern scalability, dataset size, and organizational factors. In sum, the studies support that AI-powered predictive analytics can measurably enhance risk detection, assessment, and mitigation in agile software projects.

Paper search

We performed a semantic search using the query "The Impact of AI-Powered Predictive Analytics on Risk Management Efficacy in Agile Software Development Projects" across over 138 million academic papers from the Elicit search engine, which includes all of Semantic Scholar and OpenAlex.

We retrieved the 50 papers most relevant to the query.

Screening

We screened in sources that met these criteria:

- **Agile Development Focus:** Does this study focus on agile software development projects or teams (rather than solely on waterfall, spiral, or other non-agile development methodologies)?
- **AI-Powered Risk Management:** Does this study examine AI-powered predictive analytics tools or systems specifically applied to risk management (rather than traditional non-AI predictive analytics or statistical methods without machine learning components)?
- **Risk Management Efficacy Outcomes:** Does this study measure risk management efficacy outcomes such as risk identification accuracy, risk mitigation effectiveness, project success rates, cost overruns, or schedule adherence?
- **Empirical Study Design:** Is this an empirical study (including case studies, controlled trials, quasi-experimental studies, observational studies, comparative studies) or a systematic review/meta-analysis (rather than a purely theoretical paper, opinion piece, or conceptual framework without empirical validation)?
- **Measurable Performance Data:** Does this study provide quantitative or qualitative measures of risk management performance that enable assessment of the intervention's impact?

- **Risk Management Focus:** Does this study specifically focus on AI applications for risk management (rather than examining AI applications in software development that are not specifically related to risk management, such as code generation, testing automation, or requirements analysis)?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper.

Data extraction

We asked a large language model to extract each data column below from each paper. We gave the model the extraction instructions shown below for each column.

- **AI Technology Implementation:**
 - Extract comprehensive details about the AI-powered predictive analytics approach including:
 - Specific AI/ML algorithms used (e.g., XGBoost, SVM, neural networks)
 - Data sources and types used for prediction
 - Technical architecture and integration approach
 - Real-time vs. batch processing capabilities
 - Tools, platforms, or frameworks employed
 - Level of automation achieved
- **Risk Management Application:**
 - Extract how the AI system was applied to risk management processes including:
 - Types of risks addressed (technical, schedule, budget, quality, cybersecurity)
 - Risk management processes enhanced (identification, assessment, prioritization, mitigation)
 - Integration with existing risk management frameworks
 - Frequency and timing of risk assessments
 - Decision support capabilities provided
 - Specific risk management outputs generated (alerts, recommendations, dashboards)
- **Agile Context:**
 - Extract details about the Agile environment including:
 - Specific Agile methodology (Scrum, Kanban, SAFe, etc.)
 - Project characteristics (size, duration, complexity, domain)
 - Team structure and size
 - Organization type (SME, enterprise, startup)
 - Integration with Agile tools and workflows
 - Adaptation to Agile principles (iterations, flexibility, stakeholder involvement)
- **Efficacy Measurement and Results:**
 - Extract comprehensive efficacy data including:
 - Specific metrics used to measure risk management effectiveness
 - Quantitative results with numerical values and percentages where available
 - Comparison data (before/after AI implementation, control groups)
 - Time-related improvements (detection speed, response time)
 - Quality improvements (accuracy, false positive rates, prediction precision)

- **Business impact measures** (project success rates, cost savings, delay reduction)
- **Statistical significance and confidence intervals** where reported
- **Implementation Challenges:**
 - Extract barriers, limitations, and implementation considerations including:
 - Technical challenges encountered
 - Data quality and availability issues
 - Integration difficulties with existing systems
 - User adoption and training requirements
 - Organizational resistance or cultural barriers
 - Resource requirements (time, budget, expertise)
 - Scalability limitations
 - Ethical considerations or privacy concerns mentioned
- **Success Factors:**

Study	Study Design	AI Technology Used	Agile Context	Primary Outcome Measures	Full text retrieved
Almalki, 2025	Experimental study	Optimization frameworks, predictive analytics, unspecified machine learning models	Agile software project management (iterative sprints)	Risk prediction accuracy, workload management, sprint completion rates	No (abstract only)
Akpomedeaye et al., 2025	Development and testing study	XGBoost classifiers, principal component analysis	Agile information technology projects, small and	Risk classification accuracy, real-time alerts, decision support	No (abstract only)

Explore your field with Deep Research

Goal: Introduce the use of the in-depth research option to generate academic drafts based on up-to-date scientific literature, useful for state-of-the-art reviews, thesis proposals, or articles

Example

- Start with the following prompt, which can be adapted as needed

I need a report about "Quantum technologies applied to natural language processing", including scientific sources, with a special focus on peer-reviewed journals and conference papers. I want a global perspective. Use an academic style.

Deep Research with ChatGPT

ChatGPT 5 Thinking



¿Qué estás investigando?

I need a report about "Quantum technologies applied to natural language processing", including scientific sources, with a special focus on peer-reviewed journals and conference papers. I want a global perspective. Use an academic style.

+ Investiga Fuentes

ChatGPT 5 Thinking

I need a report about "Quantum technologies applied to natural language processing", including scientific sources, with a special focus on peer-reviewed journals and conference papers. I want a global perspective. Use an academic style.

To ensure I provide the most relevant and academically rigorous report, could you please clarify the following:

1. Are you interested in specific subdomains of NLP (e.g., sentiment analysis, machine translation, semantic parsing) as they relate to quantum technologies?
2. Do you have a preferred time range for the literature (e.g., last 5 years)?
3. Should I focus more on theoretical advancements, experimental implementations, or commercial applications?
4. Would you like the report to include a comparative analysis with classical NLP techniques?
5. Do you want the report to include a bibliography formatted in a specific style (e.g., APA, IEEE)?

This will help me tailor the report to your academic needs.

📄 🌟 🗣️ 📄 🔄 ...

ChatGPT 5 Thinking

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📄 🌟 🗣️ 📄 🔄 ...

I am interested in sentiment analysis. I prefer recent literature (last 3 years), the focus should be general, I want a comparison with classical NLP techniques. Use IEEE bibliography style

+ Investiga Fuentes

I am interested in sentiment analysis, I prefer recent literature (last 3 years), the focus should be general, I want a comparison with classical NLP techniques. Use IEEE bibliography style

Great. I will prepare an academic-style report on recent (last 3 years) developments in applying quantum technologies to natural language processing, with a particular focus on sentiment analysis. The report will compare these quantum approaches to classical NLP techniques and will draw primarily from peer-reviewed journal articles and conference papers with a global perspective. The bibliography will follow the IEEE citation style.

I'll get started on this and let you know once the report is ready.

Research completed in 12m · 14 fuentes · 45 búsquedas

Quantum Technologies in Sentiment Analysis: A Comparison with Classical NLP

Quantum Technologies in Natural Language Processing for Sentiment Analysis

Introduction

Natural Language Processing (NLP) has made remarkable strides in recent years, especially in tasks like sentiment analysis, which aims to classify the emotional tone of text (positive, negative, neutral). Classical NLP techniques—ranging from machine learning classifiers to deep neural networks and transformer-based models—have achieved high accuracy on large benchmark datasets. However, they still face challenges such as understanding context-dependent meanings, handling sarcasm/irony, and scaling to massive data with complex language structures. Quantum computing has emerged as a new frontier to potentially address some of these challenges. Quantum technologies leverage principles like superposition and entanglement to process information in ways classical computers cannot, offering prospects for exponential speed-ups and novel computational paradigms. In the realm of NLP, **Quantum Natural Language Processing (QNLP)** explores encoding language data into quantum states and algorithms, with the goal of enhancing or accelerating tasks such as sentiment analysis. This report provides a comprehensive overview of recent (2022–2025) research on applying quantum computing to NLP with a focus on sentiment analysis. We summarize peer-reviewed studies from around the world, highlight theoretical frameworks and experimental results, compare quantum-based approaches to classical methods, and discuss the global landscape of this nascent field.

Recent Advances in Quantum NLP for Sentiment Analysis

Quantum NLP is a young but rapidly evolving field. In the last three years, researchers have investigated both **theoretical models** and **experimental implementations** of quantum-enhanced sentiment analysis. Below, we summarize key developments:

- **Quantum NLP Frameworks and Toolkits:** Foundational work has been done on formulating how linguistic structures can be represented on quantum computers. A notable example is the **DisCoCat framework** (Distributional Compositional Categorical model), which uses category theory to map grammar and meaning to quantum circuits.

+ Pregunta lo que quieras

In conclusion, the application of quantum technologies to sentiment analysis is an exciting frontier that sits at the intersection of cutting-edge computing and the complexity of human language. The past three years have transformed quantum NLP from a speculative idea into a budding research area with tangible demos and a growing body of literature. If current trends continue, the next few years could witness quantum sentiment analysis systems scaling up and perhaps addressing tasks that are intractable for classical NLP. Even if widespread quantum advantage in NLP remains a longer-term prospect, the journey of exploring quantum approaches is already enriching our understanding of language representation and computation. The continued evolution of this field will not only test the capabilities of quantum machines but also deepen our insights into language, learning, and cognition from a fundamentally new computational perspective.

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Deep Research with ChatGPT

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+ Pregunta lo que quieras



Vista previa

Descargar Compartir enlace

Documento PDF (.pdf) Documento de Microsoft Word (.docx)

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Best practices for using AI in literature reviews

- If AI tools have assisted in the review process, a mention of these tools and the procedure followed should be included in the methodology section [10]
- General-purpose tools or Large Language Models (LLMs) [11], such as ChatGPT (<https://chat.openai.com>) [12], can be used as a starting point to gain an initial understanding of a topic. However, it is recommended that researchers subsequently locate relevant papers using tools more focused on scholarly literature, such as Consensus or SciSpace
- Although LLMs show promise in supporting the creation of literature reviews, fully established or validated applications are often lacking. The rapid growth of research on the use of LLMs for evidence synthesis highlights their increasing relevance [13]

Best practices for using AI in literature reviews

- In the initial understanding of a topic or research question, it can be helpful to create a mind map, for example, by generating one with ChatGPT [10]
- Elicit is an excellent tool for identifying and designing research questions
- For narrative syntheses, Epsilon (comprehensive and well-structured), Consensus, SciSpace, or Elicit are recommended. The “deep research” capabilities of ChatGPT, Perplexity, Gemini, or Grok can also be explored
- To obtain a summary or ask questions about a specific article for which the full text is available, ChatGPT, NotebookLM, or SciSpace are recommended

Best practices for using AI in literature reviews

- Generative AI in academic work can be seen as a process facilitator, but it must be applied with critical thinking [14]
 - **Examination:** Do not accept anything without asking the question: Is this consistent with the bulk of the best available evidence?
 - **Logic:** Apply logical reasoning. This requires competence in both informal and formal logic
 - **Verification:** Check the coherence and compatibility of new ideas or data with the body of prior knowledge or the best existing evidence



```
class Calculator {  
  public class add {  
    public int add(int int) {  
      return sum;  
    }  
  }  
}
```

UNIVERSIDAD SALAMANGA

X/>> Test Passed



IA GENERATIVA EN LA INVESTIGACION



Code generation

SALAMANGA

Generating code

I would like you to provide Python code that implements a simple economic analysis, where the final result depends on input values provided by the user (e.g., prices, interest rates, elasticities, or units produced).

► *The code must:*

- *Be commented line by line or by blocks to make it easy to understand.*
- *Include user-defined inputs (via keyboard input or easily editable variables).*
- *Generate clear, viewable output (it can be text, a table, or a simple chart using matplotlib or seaborn).*
- *Represent a basic economic relationship or model, such as:*
 - *Break-even point (supply = demand)*
 - *Net profit as a function of revenue and costs*
 - *Compound or accumulated growth*
 - *Comparison between two scenarios*

► *In addition, I need a brief textual explanation (in English) that:*

- *Describes what the program represents*
- *Indicates how to modify the input values*
- *Explains how to interpret the results*



F I would like you to provide Python code that implements a simple economic analysis, where the final result depends on input values provided by the user (e.g., prices, interest rates, elasticities, or units produced).

► The code must:

- Be commented line by line or by blocks to make it easy to understand.
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- Represent a basic economic relationship or model, such as:
 - Break-even point (supply = demand)
 - Net profit as a function of revenue and costs
 - Compound or accumulated growth
 - Comparison between two scenarios
- In addition, I need a brief textual explanation (in English) that:
 - Describes what the program represents
 - Indicates how to modify the input values
 - Explains how to interpret the results

I'll create a comprehensive economic analysis tool that calculates the break-even point and profit analysis for a business. This is one of the most fundamental economic models used in business decision-making.

Break-Even Analysis & Profit Calculator

Código



Break-Even Analysis & Profit Calculator - User Guide

What This Program Represents

This program implements a **break-even analysis**, one of the most fundamental economic models in business decision-making. It calculates the exact point where a business neither makes a profit nor incurs a loss—where total revenue equals total costs.

The model is based on the **Cost-Volume-Profit (CVP) relationship**:

- **Fixed Costs:** Expenses that remain constant regardless of production (rent, salaries, insurance)
- **Variable Costs:** Expenses that change with each unit produced (materials, direct labor)
- **Revenue:** Income from selling products

Economic Formula: Break-Even Units = Fixed Costs ÷ (Selling Price - Variable Cost per Unit)

How to Modify Input Values

When you run the program, it will prompt you to enter four key values:

1. **Fixed Costs (\$):** Enter your total fixed expenses (e.g., 10000 for \$10,000)
2. **Variable Cost per Unit (\$):** Cost to produce one unit (e.g., 15 for \$15)
3. **Selling Price per Unit (\$):** Price at which you sell each unit (e.g., 35 for \$35)
4. **Maximum Units to Analyze:** Upper limit for the charts (e.g., 1500)

Alternative: You can also edit the default values directly in the code (lines 21-30) if you prefer not to enter them each time.

How to Interpret the Results

1. Text Output:

- **Contribution Margin:** The amount each unit contributes to covering fixed costs (Selling Price - Variable Cost)
- **Break-Even Point:** The exact number of units you must sell to cover all costs
- **Break-Even Revenue:** Total sales dollars needed to break even
- **Scenario Analysis Table:** Shows profit/loss at different production levels (50%, 75%, 100%)

Responder a Claude...



Sonnet 4.5



```
import matplotlib.pyplot as plt
import numpy as np

# =====
# BREAK-EVEN POINT AND PROFIT ANALYSIS
# =====
# This program calculates the break-even point where total revenue equals
# total costs, and visualizes profit/loss at different production levels.
# =====

print("=" * 60)
print("BREAK-EVEN POINT AND PROFIT ANALYSIS")
print("=" * 60)

# -----
# USER INPUTS - Modify these values to analyze different scenarios
# -----

# Fixed costs: expenses that don't change with production volume
# Examples: rent, salaries, insurance, equipment depreciation
fixed_costs = float(input("Enter Fixed Costs ($): ") or 10000)

# Variable cost per unit: cost that varies with each unit produced
# Examples: raw materials, direct labor, packaging
variable_cost_per_unit = float(input("Enter Variable Cost per Unit ($): ") or 15)

# Selling price per unit: revenue generated from each unit sold
selling_price_per_unit = float(input("Enter Selling Price per Unit ($): ") or 35)

# Maximum units to analyze (for visualization purposes)
max_units = int(input("Enter Maximum Units to Analyze: ") or 1500)

print("\n" + "=" * 60)

# -----
# CALCULATIONS
# -----

# Contribution margin per unit: amount each unit contributes to covering
# fixed costs and generating profit
contribution_margin = selling_price_per_unit - variable_cost_per_unit

# Check if business model is viable (selling price must exceed variable cost)
if contribution_margin <= 0:
    print("ERROR: Selling price must be greater than variable cost per unit!")
    print("Current model will result in losses at any production level.")
    exit()

# Break-even point: number of units needed to cover all costs (profit = 0)
# Formula: Break-even = Fixed Costs / Contribution Margin per Unit
break_even_units = fixed_costs / contribution_margin


# Break-even revenue: total sales revenue at break-even point
break_even_revenue = break_even_units * selling_price_per_unit

# -----
# DISPLAY RESULTS
# -----

print("ANALYSIS RESULTS:")
print("=" * 60)
print(f"Fixed Costs:                ${fixed_costs:,.2f}")
print(f"Variable Cost per Unit:       ${variable_cost_per_unit:,.2f}")
print(f"Selling Price per Unit:       ${selling_price_per_unit:,.2f}")
print(f"Contribution Margin per Unit:  ${contribution_margin:,.2f}")
print(f"\nBREAK-EVEN POINT:           {break_even_units:,.2f} units")
print(f"Break-Even Revenue:          ${break_even_revenue:,.2f}")
print("=" * 60)

# -----
# SCENARIO ANALYSIS - Calculate profit at different production levels
# -----
```

Generating code

- **The provided code is standard Python**, so it cannot be executed directly in a regular web browser as if it were a typical website.
- To run the code
 - Go to Google Colab: <https://colab.research.google.com/>
 - Click **“New Notebook”**
 - Copy and paste the Python code into a cell
 - Click the **play button** () to the left of the cell to execute the code
 - Enter the requested values in the input box that appears below the cell
 - **Interpret the results:** the number of units and the graph will appear automatically

Running the code

```
11 1 min
import matplotlib.pyplot as plt
import numpy as np

# =====
# BREAK-EVEN POINT AND PROFIT ANALYSIS
# =====
# This program calculates the break-even point where total revenue equals
# total costs, and visualizes profit/loss at different production levels.
# =====

print("=" * 60)
print("BREAK-EVEN POINT AND PROFIT ANALYSIS")
print("=" * 60)

# -----
# USER INPUTS - Modify these values to analyze different scenarios
# -----

# Fixed costs: expenses that don't change with production volume
# Examples: rent, salaries, insurance, equipment depreciation
fixed_costs = float(input("Enter Fixed Costs ($): ") or 10000)

# Variable cost per unit: cost that varies with each unit produced
# Examples: raw materials, direct labor, packaging
variable_cost_per_unit = float(input("Enter Variable Cost per Unit ($) or 15)

# Selling price per unit: revenue generated from each unit sold
selling_price_per_unit = float(input("Enter Selling Price per Unit ($) or 35)

# Maximum units to analyze (for visualization purposes)
max_units = int(input("Enter Maximum Units to Analyze: ") or 1500)

print("\n" + "=" * 60)

# -----
# CALCULATIONS
# -----

# Contribution margin per unit: amount each unit contributes to covering
# fixed costs and generating profit
contribution_margin = selling_price_per_unit - variable_cost_per_unit

# Check if business model is viable (selling price must exceed variable cost)
if contribution_margin <= 0:
    print("ERROR: Selling price must be greater than variable cost per unit!")
    print("Current model will result in losses at any production level.")
    exit()

# Break-even point: number of units needed to cover all costs (profit = 0)
# Formula: Break-even = Fixed Costs / Contribution Margin per Unit
break_even_units = fixed_costs / contribution_margin

# Break-even revenue: total sales revenue at break-even point
break_even_revenue = break_even_units * selling_price_per_unit

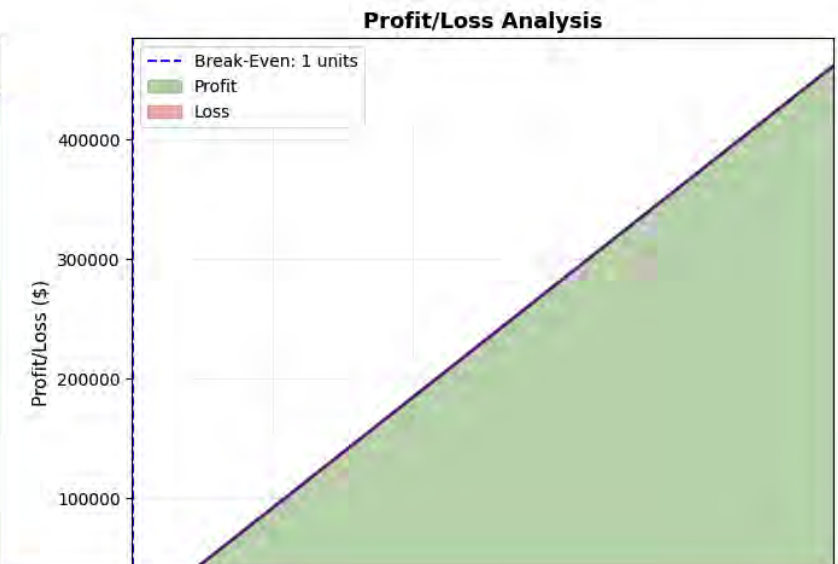
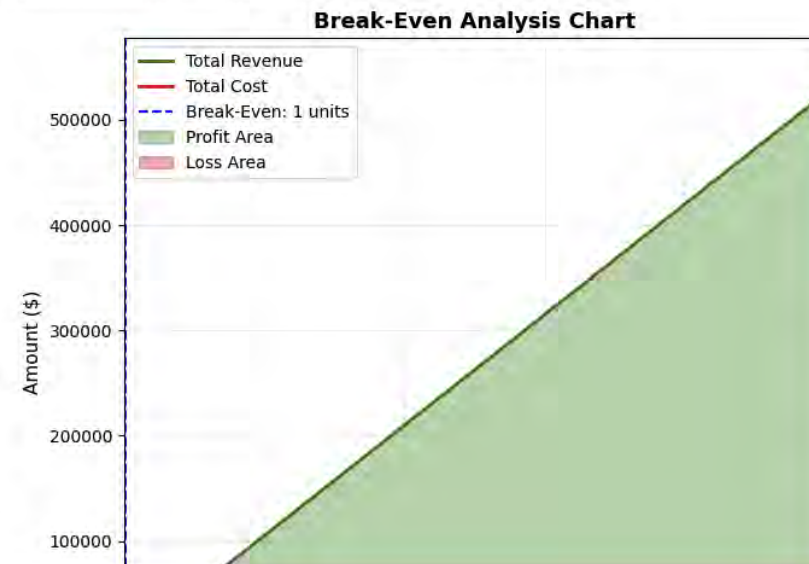
# -----
# DISPLAY RESULTS
# -----

print("ANALYSIS RESULTS:")
print("-" * 60)
print(f"Fixed Costs:                ${fixed_costs:,.2f}")
print(f"Variable Cost per Unit:      ${variable_cost_per_unit:,.2f}")
print(f"Selling Price per Unit:      ${selling_price_per_unit:,.2f}")
print(f"Contribution Margin per Unit: ${contribution_margin:,.2f}")
print(f"\nBREAK-EVEN POINT:          {break_even_units:,.2f} units")
print(f"Break-Even Revenue:         ${break_even_revenue:,.2f}")
print("=" * 60)

# -----
# SCENARIO ANALYSIS - Calculate profit at different production levels
# -----

# Test specific production levels
test_levels = [
```

```
11 1 min
=====
BREAK-EVEN POINT AND PROFIT ANALYSIS
=====
Enter Fixed Costs ($): 670
Enter Variable Cost per Unit ($): 125
Enter Selling Price per Unit ($): 1050
Enter Maximum Units to Analyze: 500
=====
ANALYSIS RESULTS:
=====
Fixed Costs:                $670.00
Variable Cost per Unit:     $125.00
Selling Price per Unit:     $1,050.00
Contribution Margin per Unit: $925.00
=====
BREAK-EVEN POINT:          0.72 units
Break-Even Revenue:       $760.54
=====
SCENARIO ANALYSIS:
=====
Units      Revenue      Total Cost      Profit/Loss
-----
0          $0.00         $670.00         -$670.00
0          $0.00         $670.00         -$670.00
0          $0.00         $670.00         -$670.00
0          $0.00         $670.00         -$670.00
1          $1,050.00     $795.00         $255.00
=====
```





Data collection

From speech to patterns: AI-assisted interview analysis

Goal: Apply a chain of digital tools to transform a raw interview into an analytical visual resource (word cloud) with the support of generative AI

Dynamic

1. Recording the interview
 - Recommended tools
 - Smartphone (built-in recorder or apps like *Voice Memos* or *Easy Voice Recorder*)
 - Alternatively, *Zoom* or *Google Meet* with recording enabled
2. Automatic transcription
 - Upload the audio to a transcription tool to get the full text
 - Recommended tools
 - Whisper Web UI (based on OpenAI's Whisper, free)
 - Otter.ai (freemium)
 - Google Docs with voice typing (simple live alternative)

From speech to patterns: AI-assisted interview analysis

Dynamic

3. Text processing with a generative AI
 - Insert the transcribed text into a generative AI tool (such as ChatGPT or Gemini) so it can identify
 - Key terms
 - Recurring themes
 - Overall sentiment (optional)

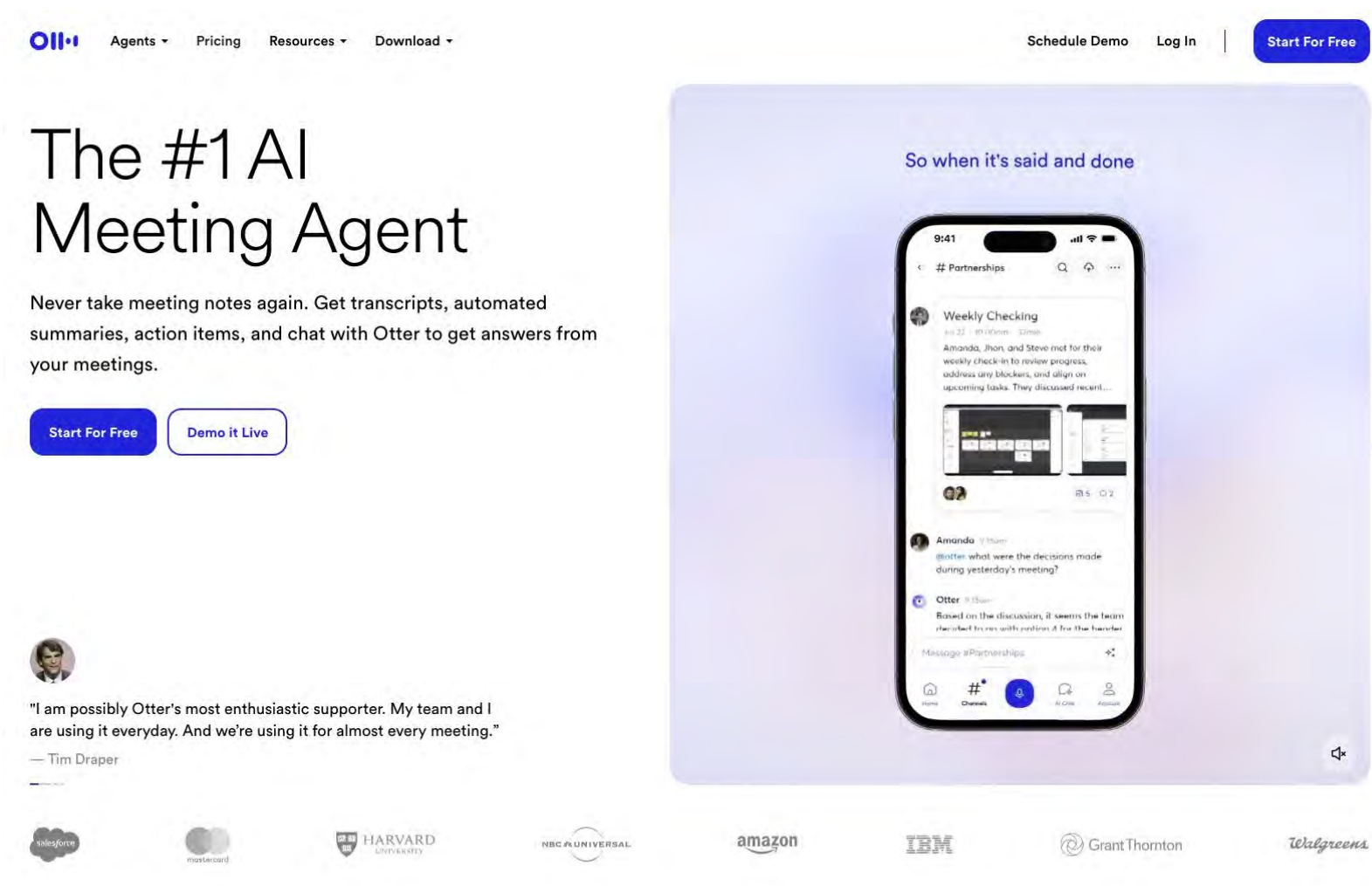
Use the following prompt as a base

Extract the most frequent and relevant words from the following text to create a representative word cloud of the discourse. Remove connectors, pronouns, and insignificant repetitions

4. Word cloud generation
 - Use the extracted terms to create a visualization
 - Recommended tools
 - WordArt.com
 - MonkeyLearn WordCloud Generator
 - Voyant Tools (if you want to integrate more text)
 - Claude Sonnet

Audio transcriptions

- In otter.ai (<https://otter.ai>), it is possible to record an audio or import an existing one



Importing and transcribing



Transcribe audio and video

Drag & Drop

AAC, MP3, M4A, WAV, WMA
MOV, MPEG, MP4, WMV

Browse files

3 of 3 imports left Upgrade to Business for unlimited imports

Software Engineering Methodologies Overview

Francisco José García Peña

Summary Transcript

Keywords

Speakers

Speaker 1 (59%), Speaker 2 (40%), Speaker 3 (2%)

Speaker 1 0:00
Bienvenido a bienvenido, vamos a Explora un poco como se construy el software que osamos cada dia nos yaremos por unos apuntes ingenieria de software del Universidad de Salamanca se Centra mucho en dos cosas, el proceso, las metodologias, las ideas bueno, entender como se planifica y se crea todo esto, no ver que Detra valen em pesemos. A ello

Speaker 2 0:21
Vale em pecemos, por lo vasigo el proceso software que es exactamente

Speaker 1 0:26
los apontes dicen que es como el marco de trabajo, no las actividades ordenadas para crear software de calidad, casi como los planos para un edificio podremos decir

Speaker 2 0:36
exacto, exacto, pero para un edificio digital, claro, ese Marco hacer en que orden que se Pere ya se han modelos, codigo, documentos e como controller, que todo ba ya bien esclavi para organizar alquipo, para que se comunican bien y por supuesto, para la calidad final Suen

Speaker 1 0:57
al logico, pero a parece que no siempre fue tan organizado. Mencionan un modelo Primitivo. O eso de codifica y mejora OOF Suen un poco as alto de Mata. No Bueno,

Speaker 2 1:11
si practicamente, por algo lo llaman anti modelo era digamos lanzar se apicar codigo, casi sin pensar el resultado codigo spaghetti, this ardinado, ecosystem, codification, uno de tras de otro, muy secuencial, C pero

Speaker 1 1:31
las notas tambien, dicen que era muy rigido, que esto

Speaker 2 1:43
summitad de proyecto y el cliente cambia de idea o surgen imprevisto Technical con la Cascada era casi como volver a la casilla de salida, muy inflexible, clara, no maneja va bien, ni los cambios, ni la incertidumbre que siempre el Principia la realidad, tu obliga rectificar entiendo

Speaker 1 2:03
la vida real no estan lineal y que vino despez Veo aqui que habland de prototipos,

Speaker 2 2:10
efectivamente, la idea de los prototipoliente para Clara dudas para validar un disen Yo complicado antes de meter de afondo bale algunos per to tipo son solo para eso se usan y setiran de seables. Otros, En cambio, Van creciendo, evolucionando hasta convertirse en el producto final. Son los evolutivos. Ayuda muchisimo reducir riesgos el principio

Speaker 1 2:35
tiene mucho sentido si probar antes de construir al grande y tambien, mencionan los modelos evolutivos. Cada

Speaker 2 2:47
vuelta de la spiral digamos de Paris a pensar que puede salir Malaki, quality mismo y la siguiente fase a menudo con un Prototipo se center en ATA car ser riesgo de permiten trigger versiones funcionales poco a poco, y adaptarte mucho mejor. Baile

Speaker 1 2:17
valer entendido Los modelos de procesos, un como el mapa general, la estrategia, pero fatal Diana como se lleva es alla practica a entra las methodology as Verda justo hay

Ask AI anything about this conversation or chat with your teammates

How can we effectively apply the principles of the Agile manifesto to our software development process?

What are the key differences between the Cascado model and the evolutionary/prototyping models, and how can we leverage those differences?

What specific Agile practices, such as Scrum or Kanban, would be most beneficial for our team to explore further in the follow-up meeting?

Summary

The screenshot shows a Slack interface with a message from Francisco José García Peñalvo. The message content is as follows:

Software Engineering Methodologies Overview

Francisco José García Peñalvo Today at 12:27 am 7 min Copy Summary

Summary Transcript Template: General

Overview

The discussion explores software engineering methodologies, emphasizing the evolution from rigid, inflexible models like the Waterfall method to more adaptive approaches. The Waterfall model, described as "codifica y mejora," was criticized for its inflexibility in handling changes and uncertainties. Prototyping emerged as a solution to validate designs before full implementation, with some prototypes evolving into final products. The conversation highlights the shift towards more structured, data-centric methodologies and the introduction of object-oriented design for better reusability. Agile methodologies, such as Scrum and Kanban, are noted for their focus on people, adaptability, and continuous improvement.

Action Items

- Explore the Agile manifesto in more detail.
- Review the notes from this meeting and identify any key takeaways to share with the team.
- Schedule a follow-up meeting to discuss specific Agile practices like Scrum.

+ Add action item

Outline

Overview of Software Engineering Methodologies

- Speaker 1 introduces the topic, emphasizing the importance of understanding the process and methodologies in software engineering.
- Speaker 2 explains that the software process is a framework for creating high-quality software, similar to blueprints for a building.
- The discussion highlights the evolution from primitive models like "codifica y mejora" to more organized approaches.
- Speaker 2 describes the rigidity and inflexibility of the "Cascada" model, which struggled to handle changes and uncertainties.

Prototyping and Evolutionary Models

- Speaker 1 and Speaker 2 discuss the concept of prototypes, which help clarify design doubts and validate complex designs before full implementation.
- Some prototypes remain static, while others evolve into the final product, reducing risks through incremental development.
- The conversation touches on the spiral model, which includes phases of prototyping and risk management.
- Speaker 1 notes the importance of testing before full-scale construction to mitigate potential issues.

Processes and Methodologies

- Speaker 1 differentiates between processes (general strategies) and methodologies (specific techniques and tools).
- Speaker 2 explains that methodologies include concrete steps, processes, data, and the use of object-oriented design for better reusability.
- The shift towards object-oriented design is highlighted as a significant change, focusing on interacting objects with their own data and functions.
- Speaker 1 mentions the Agile manifesto, which values individuals and adaptations over processes and tools.

Agile and Other Methodologies

- Speaker 2 elaborates on the Agile philosophy, emphasizing flexibility, collaboration, and continuous improvement.
- The conversation includes specific Agile practices like Scrum, Kanban, and Lean, which focus on transparency, inspection, and adaptation.
- Speaker 1 and Speaker 2 discuss the benefits of these methodologies, such as improved communication and adaptability.
- The discussion concludes with a summary of the various methodologies and their impact on software development practices.

AI Chat Comments

Ask AI anything about this conversation or chat with your teammates

- How can we effectively apply the principles of the Agile manifesto to our software development process?
- What are the key differences between the Cascada model and the evolutionary/prototyping models, and how can we leverage those differences?
- What specific Agile practices, such as Scrum or Kanban, would be most beneficial for our team to explore further in the follow-up meeting?

Basic (Free)



Exporting



The screenshot shows a document titled "Software Engineering Methodologies Overview" in a web interface. The document content includes:

- Summary** / **Transcript** (selected)
- Keywords:** Software engineering, methodologies, process, prototypes, evolutive models, cascada model, quality, object-oriented, Agile manifesto, Scrum, retrospectiva, inspection, adaptation, transparencia, herramientas.
- Speakers:** Speaker 1 (59%), Speaker 2 (40%), Speaker 3 (2%)

The transcript content is as follows:

- Speaker 1 0:00:** Bienvenida o bienvenido, vamos a Explora un poco como se construy el software que osamos cada dia nos yaremos por unos apuntes ingenaria de software del Universidad de Salamanca se Centro mucho en dos cosas, el proceso, las metodologias, la ideas bueno, entender como se planifica y se crea todo esto, no ver que Detra valen em pesemos. A ello
- Speaker 2 0:21:** Vale em pecemos, por lo vasigo el proceso software que es exactamente
- Speaker 1 0:26:** los apontes dicen que es como el marco de trabajo, no las actividades ordenadas para crear software de calidad, casi como los planos para un edificio podremos decir
- Speaker 2 0:36:** exacto, exacto, pero para un edificio digital, claro, ese Marco hacer en aue orden aue se Pere va se han

An "Export" dialog box is open in the foreground, showing the following options:

- Transcript Preview:** Shows a preview of the transcript content.
- Transcript:** Enabled (toggle on).
- File format:** Set to "txt".
- More Options:**
 - Show speaker names
 - Show timestamps
 - Combine paragraphs of the same speaker
 - Combine all paragraphs into one
- Takeaways:** Disabled (toggle off). Message: "There are no Takeaways in this conversation".
- Audio:** Disabled (toggle off).
- Filename:** Software Engineering Methodologies Overview_otter_.txt
- Buttons:** Cancel, Export

Example

Extract the most frequent and relevant words from the following text to create a representative word cloud of the discourse. Remove connectors, pronouns, adverbs, words that do not belong to the software or software engineering domain, and insignificant repetitions. Then, generate a WordArt-style word cloud and a table showing the frequency of the 10 most common words

Software Engineering Methodologies... 74 líneas
TXT

Extract the most frequent and relevant words from the following text to create a representative word cloud of the discourse. Remove connectors, pronouns, adverbs, words that do not belong to the software or software engineering domain, and insignificant repetitions. Then, generate a WordArt-style word cloud and a table showing the frequency of the 10 most common words

I'll analyze the document to extract software engineering-related terms and create a word cloud for you.

Software Engineering Word Cloud
Artefacto interactivo

I've created an interactive word cloud visualization based on the software engineering discourse in the document. Here's what I extracted:

Analysis Summary

From the Spanish-language transcript about software engineering methodologies, I identified and counted **24 relevant software engineering terms**, filtering out:

- Common connectors and pronouns (que, para, como, etc.)
- Adverbs and articles
- Generic verbs not specific to the domain
- Filler words and conversation markers

Top 10 Most Frequent Terms

1. **software** - 8 occurrences
2. **proceso** - 7 occurrences
3. **modelo** - 6 occurrences
4. **metodología** - 6 occurrences
5. **código** - 5 occurrences
6. **prototipo** - 4 occurrences
7. **cascada** - 4 occurrences
8. **calidad** - 3 occurrences
9. **evolutivo** - 3 occurrences
10. **Agile** - 3 occurrences

The word cloud uses size and color intensity to represent frequency, with the most common terms appearing larger and more prominent. The visualization reflects the document's focus on software processes, methodologies (particularly Waterfall/Cascada and Agile), and development approaches like prototyping and evolutionary models.

Reintentar
Claude puede cometer errores. Por favor, verifique las respuestas.

Responder a Claude...
Sonnet 4.5

Software Engineering Discourse

Word Cloud Analysis

Hide Frequency Table

RANK	TERM	FREQUENCY	VISUAL
#1	software	8	<div style="width: 80%;"></div>
#2	proceso	7	<div style="width: 70%;"></div>
#3	modelo	6	<div style="width: 60%;"></div>
#4	metodología	6	<div style="width: 60%;"></div>
#5	código	5	<div style="width: 50%;"></div>
#6	prototipo	4	<div style="width: 40%;"></div>
#7	cascada	4	<div style="width: 40%;"></div>
#8	calidad	3	<div style="width: 30%;"></div>
#9	evolutivo	3	<div style="width: 30%;"></div>
#10	Agile	3	<div style="width: 30%;"></div>

Total unique terms analyzed: 24





Data analysis

Analysis of data from an Excel spreadsheet

Goal: Identify and compare youth literacy rates (ages 15–24) across UNICEF regions to understand geographic patterns. The dataset is available at https://data.unicef.org/wp-content/uploads/2021/04/Literacy-rate_2021-1.xlsx

Example

You are a data analyst. Using the file “Literacy-rate_2021-1.xlsx”, complete the following steps for the sheet “Youth literacy rate, aged 15–24”:

1. *Load the data and extract only the columns “Region” and “Total” (overall youth literacy rate).*
2. *Calculate the average youth literacy rate (column “Total”) for each unique value of “Region.”*
3. *Generate a horizontal bar chart showing each region’s average youth literacy percentage.*
4. *Based on the results, answer:*
 - *Which regions have the highest and lowest literacy rates?*
 - *What socioeconomic or political factors might explain these differences?*
 - *Is there any region whose position surprises you? Justify your answer.*



Literacy Rate 2021 1 Cover Page ▾

	Unnamed: 0	Unnamed: 1	
1			
2			
3		UNICEF Global database on literacy rate	
4		Last update: April 2021	
5			
6	Indicator definition		

Eres un analista de datos. Utilizando el archivo "Literacy-rate_2021-1.xlsx", realiza los siguientes pasos para la hoja "Youth literacy rate, aged 15-24":

Carga los datos y extrae únicamente las columnas "Region" y "Total" (tasa global de alfabetización juvenil).

Calcula la tasa promedio de alfabetización juvenil (columna "Total") para cada valor único de "Region".

Genera un gráfico de barras horizontales que muestre, para cada región, su porcentaje promedio de alfabetización juvenil.

A partir del resultado, responde:

¿Qué regiones presentan las tasas más altas y cuáles las más bajas?

¿Qué factores socioeconómicos o políticos podrían explicar esas diferencias?

¿Hay alguna región cuya posición te sorprenda? Justifica tu respuesta.



Literacy Rate 2021 1 Cover Page

	Unnamed: 0	Unnamed: 1
1		
2		
3		UNICEF Global database on literacy rate
4		Last update: April 2021
5		
6	Indicator definition	

You are a data analyst. Using the file "Literacy-rate_2021-1.xlsx", complete the following steps for the sheet "Youth literacy rate, aged 15-24":

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Based on the results, answer:

- Which regions have the highest and lowest literacy rates?
- What socioeconomic or political factors might explain these differences?
- Is there any region whose position surprises you? Justify your answer.

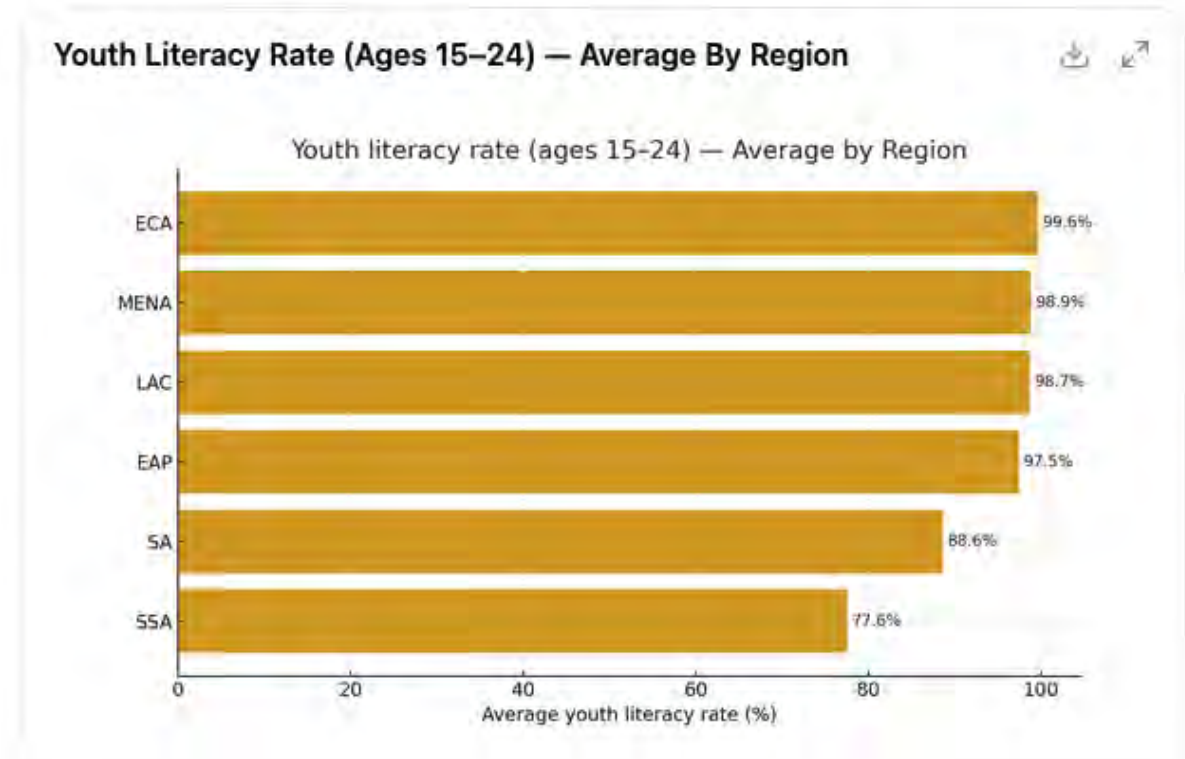
Pensó durante 13s

Youth Literacy (15-24) - Extracted Columns

		Region	Total
1	1	SA	65.42054748535156
2	2	ECA	99.33000183105469
3	3	MENA	97.42652130126953
4	8	LAC	99.50552368164062
5	14	MENA	99.68720245361328
6	15	SA	94.8624267578125

Average Youth Literacy (15-24) By Region

	Region	Avg_Total
1	SSA	77.56
2	SA	88.62
3	EAP	97.46
4	LAC	98.73
5	MENA	98.87
6	ECA	99.64



Pensó durante 28s >

I've loaded the sheet, pulled just **Region** and **Total**, computed the mean youth literacy rate by region, and plotted it. You can scroll up to see the two tables ("Extracted Columns" and "Average by Region") and the horizontal bar chart.

Findings (from the computed averages):

- **Highest: ECA (Europe & Central Asia) — 99.6%**
- **Lowest: SSA (Sub-Saharan Africa) — 77.6%**
- Others (for context): **MENA 98.9%, LAC 98.7%, EAP (East Asia & Pacific) 97.5%, SA (South Asia) 88.6%**.

Why these differences? (succinct factors)

- **Income & public spending:** Higher-income regions (ECA, LAC, EAP) typically invest more in universal primary/secondary education, teacher training, and school infrastructure—pushing youth literacy close to saturation.
- **Conflict & instability:** Parts of **SSA** and some **SA** countries face conflict, displacement, or fragile governance, disrupting schooling and lowering completion rates.
- **Educational access & quality:** Rural distance to schools, shortage of qualified teachers, and limited secondary enrollment particularly affect **SSA** and parts of **SA**.
- **Gender norms & inequality:** Where girls' secondary attendance lags (some **SA** and **SSA** contexts), youth literacy averages are pulled down.
- **Language & curriculum:** Multilingual settings without strong mother-tongue instruction or adequate materials can depress early reading outcomes (more common in **SSA**).

Any surprising positions?

- **MENA at ~99%** is notably high and may surprise some, given headlines about adult literacy gaps in parts of the region. But youth cohorts have benefited from **rapid expansions in schooling over the last 2–3 decades**, pushing *youth* literacy close to universal even where *adult* literacy still trails.
- A second mild surprise is **LAC ≈ ECA**, reflecting sustained progress on access/completion and regional literacy initiatives that have raised basic skills broadly across Latin America & the Caribbean despite heterogeneity within the region.

If you want, I can also export the grouped results to CSV or save the chart as a PNG.



Support for scientific writing

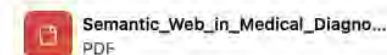


Conversion of bibliographic reference style

Goal: Convert a list of bibliographic references from one style to another

Example

I need you to convert the references in this article to APA7 format and display them on screen in alphabetical order, as specified by APA, in markdown format



I need you to convert the references in this article to APA7 format and display them on screen in alphabetical order, as specified by APA, in markdown format

Pensó durante 2m 10s

Here are the article's references converted to APA 7th edition and sorted alphabetically:

- Alshuhail, A., Thakur, A., Chandramma, R., Mhaesh, T. R., Almusharrat, A., Kumar, V. V., & Khan, S. B. (2024). Refining neural network algorithms for accurate brain tumor classification in MRI imagery. *BMC Medical Imaging*, 24, 118. <https://doi.org/10.1186/s12880-024-01285-6>
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Can you generate these references for me in BibTeX format?



Example

Can you generate these references for me in BibTeX format?

Pensó durante 16s

Sure—here are BibTeX entries for the references you provided. You can paste this straight into your .bib file.

```

bibtex Copiar código

@article{Alshuhail2024Refining,
  author = {Alshuhail, A. and Thakur, A. and Chandramma, R. and Mhaesh, T. R. and Almu},
  title = {Refining neural network algorithms for accurate brain tumor classification},
  journal = {BMC Medical Imaging},
  year = {2024},
  volume = {24},
  pages = {118},
  doi = {10.1186/s12880-024-01285-6}
}

@article{BaenaRojas2022Traits,
  author = {Baena-Rojas, J. J. and Ram{\i}rez-Montoya, M. S. and Mazo-Cuervo, D. M.},
  title = {Traits of complex thinking: A bibliometric review of a disruptive construc},
  journal = {Journal of Intelligence},
  year = {2022},
  volume = {10},
  number = {3},
  pages = {37},
  doi = {10.3390/jintelligence10030037}
}

@article{BaenaRojas2023Reflections,
  author = {Baena-Rojas, J. J. and Su{\a}rez-Brito, P. and L{\o}pez-Caudana, E. O.},
  title = {Reflections about complex thought and complex thinking: Why these theoreti},
  journal = {European Journal of Contemporary Education},
  year = {2023},
  volume = {12},
  number = {1},
  pages = {4--18},
  doi = {10.13187/ejced.2023.1.4}
}

@article{Brochhausen2022Assessing,
  author = {Brochhausen, M. and Whorton, J. M. and Zayas, C. E. and Kimbrell, M. P. an},
  title = {Assessing the need for semantic data integration for surgical biobanks{\te},
  journal = {Journal of Personalized Medicine},
  year = {2022},
  volume = {12},
  number = {5},
  pages = {757},
  doi = {10.3390/jpm12050757}
}

@article{Constant2022Integrating,
  author = {Constant, A. and Badcock, P. and Friston, K. and Kirmayer, L. J.},
  title = {Integrating evolutionary, cultural, and computational psychiatry: A multi},
  journal = {Frontiers in Psychiatry},
  year = {2022},
  volume = {13},
  pages = {763380},
  doi = {10.3389/fpsyt.2022.763380}
}

@article{Gams2019Artificial,
  author = {Gams, M. and Gu, Y. I. and H{\a}rm{\a}, A. and Mu{\n}oz, A. and Tam, V.},
  title = {Artificial intelligence and ambient intelligence},
  journal = {Journal of Ambient Intelligence and Smart Environments},
  year = {2019},

```

Scientific communication



Generating a spotlight for an article on ResearchGate



Goal: Write a spotlight on a scientific article (300 characters explaining what this research has achieved, why it is important, etc.) for ResearchGate

Example

I need a ResearchGate spotlight of 300 characters including 1) What did this research accomplish? Why is this research important?

ChatGPT 5 Thinking ▾



humanfactors-2025-1-e69333.pdf
PDF

I need a ResearchGate spotlight of 300 characters including 1) What did this research accomplish? Why is this research important?

Here is a concise ResearchGate spotlight (≤ 300 characters) based on your research paper:

This study identifies 12 key human-computer interaction elements that improve clinical decision support systems (CDSSs). It fills a crucial research gap by offering a framework to enhance usability, data accuracy, and medical decision-making.

Infographic generation

Goal: Create infographics from the content of an article for a poster or presentation

Example

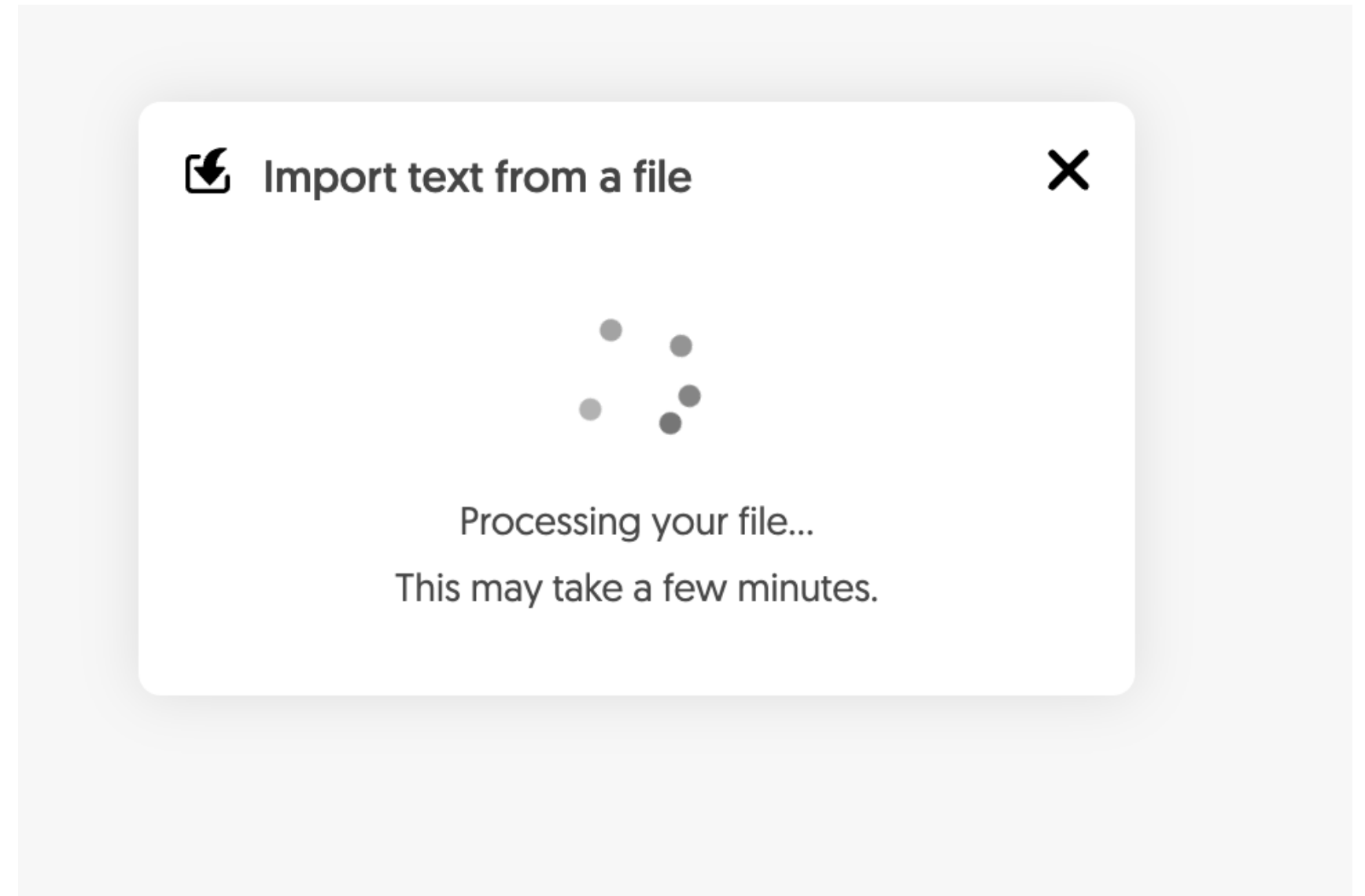
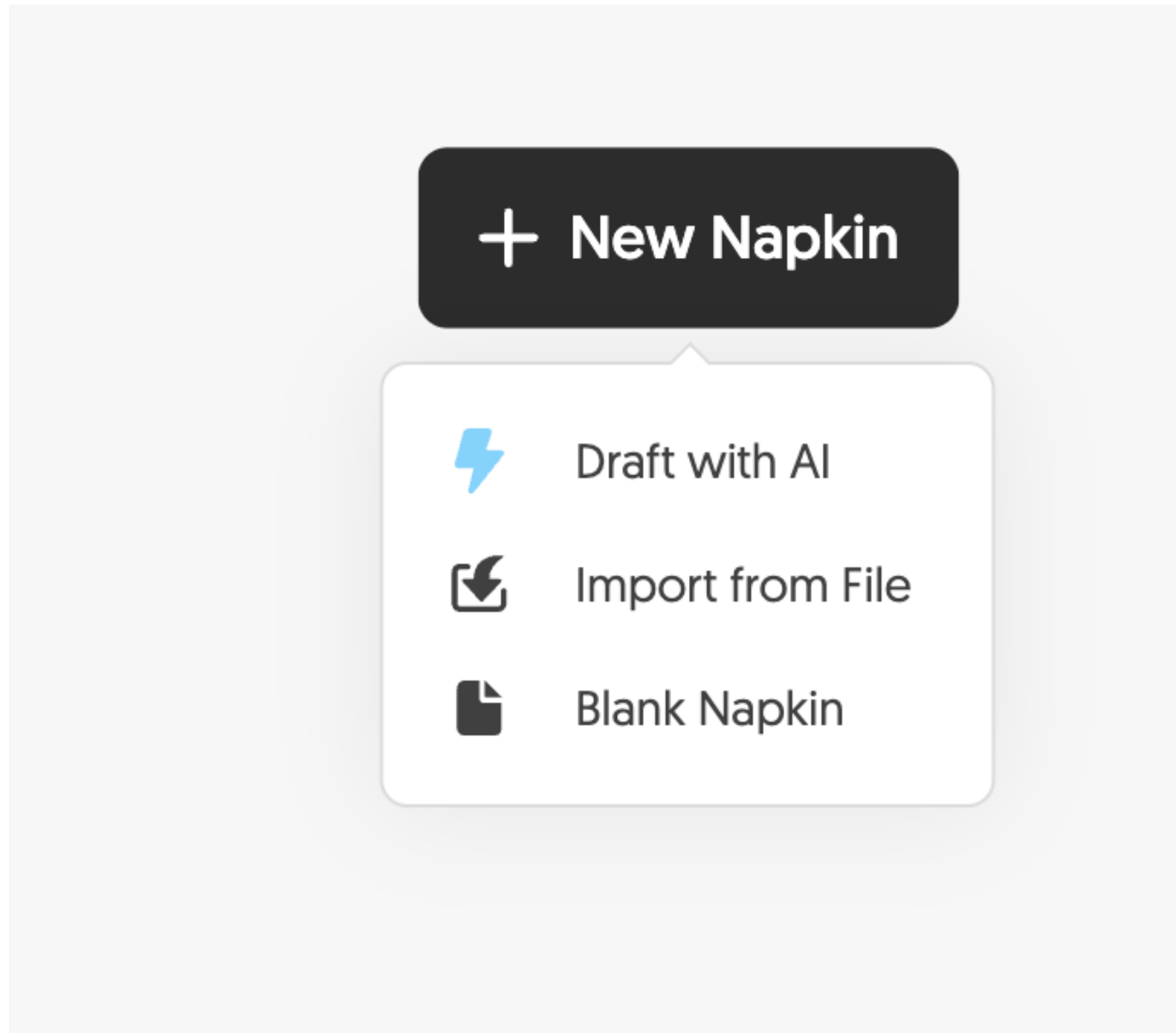
1. Use napkin.ai (<https://www.napkin.ai/>)
2. Upload the paper or the text
3. Generate the infographics

Example



The screenshot shows the homepage of Napkin.ai. The browser address bar displays "www.napkin.ai". The navigation menu includes "Home", "Pricing", and "About us". There are "Sign in" and "Get Napkin Free" buttons. The main headline reads "Get visuals from your text" with a lightning bolt icon. Below this, a sub-headline states: "Napkin turns your text into visuals so sharing your ideas is quick and effective." A diagram illustrates the process: five categories (Mindmaps, Flowcharts, Data Graphics, Metaphors, Images) are listed on the left, each with an icon. Arrows from these categories point towards a central lens icon, which then points to a napkin icon labeled "Napkin".

Example



Example

The screenshot shows a digital note-taking application interface. At the top left, there is a 'Library' icon and a '+ New Napkin' button. The main content area displays a document titled 'Untitled'. The document text is as follows:

Learning Outcomes Evaluation Through Learning Analytics Systems in Higher Education: A Systematic Literature Review
Mo'nica Hernández-Campos 1, Antonio Gonzalez-Torres 1, and Francisco José García-Peñalvo 2

Abstract
Learning analytics is pivotal for supporting learning, with recent research shifting from concepts to reviews. However, understanding factors influencing learning outcomes in higher education through analytics systems remains underexplored. This study aims to fill this gap, providing a holistic view of factors affecting learning outcomes in higher education through a systematic literature review. The goal is to unravel the intricate connections among factors, learning environments, research scopes, and theory. The search yielded 1,662 results, with 27 studies selected. "Engagement" emerged as the most prevalent factor, followed by "platform behavior," while "demographic features" and "self-assessment" were least prevalent. Most research focused on learning outcomes as final grades, lacking a consistent theoretical definition. Studies were mainly conducted in virtual and blended learning environments, spanning multiple courses or focusing on a single course. Despite extensive research on learning behavior and engagement in learning management systems, prevalence does not necessarily indicate a comprehensive understanding of factors influencing learning outcomes. This implies a potential gap in information gathering or analysis for deeper insights. Moreover, the lack of a consistent theoretical framework and the restriction of analyses to final or partial grades in virtual or blended learning environments suggest areas for improvement in learning analytics research. The study proposes directions for enhancing research in this field to unlock its full potential.

Keywords
learning analytics, learning outcomes, factors, higher education

Introduction
Learning Analytics (LA) measures, collects, analyzes, and reports data about learners and their contexts. Since 2012, researchers have highlighted the potential impact of LA in existing models of education, in particular within higher education institutions (HEIs), that generate significant insights into the learning process (Siemens, 2012). LA aims to aid instructors and academic staff in the understanding and optimization of the learning environments to make final decisions in the educational field (Siemens & Baker, 2012). Some of the benefits of using LA are student advising, performance progress monitoring, supervision and feedback, intelligent tutoring systems, institution policymaking (Namoun & Alshanjiti, 2021; Qiu et al., 2022), and fostering a deeper understanding and support for student learning (Viberg et al., 2018). These systems also have the potential to assist practitioners in making pedagogically informed decisions related to teaching contexts as well as reflecting on valuable information to collect in learning management systems (LMS; Lockyer et al., 2013).

1 Instituto Tecnológico de Costa Rica, Cartago, Costa Rica
2 Universidad de Salamanca, Spain

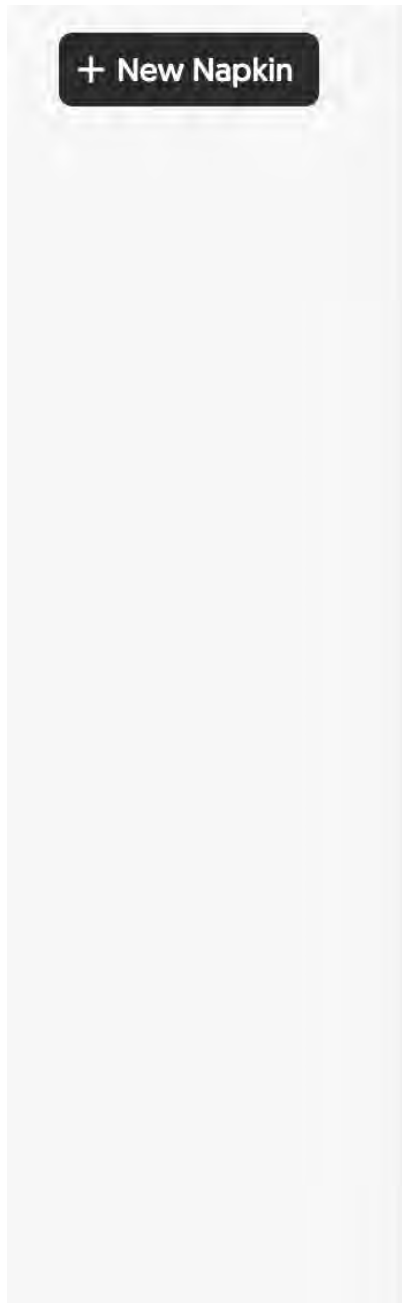
Corresponding Author:
Mo'nica Hernández-Campos, Instituto Tecnológico de Costa Rica, Cartago 159-7050, Costa Rica.
Email: mohernandez@itcr.ac.cr

Data Availability Statement included at the end of the article

Recently, the field of LA has transitioned from conceptual papers to review articles (Blumenstein, 2020). Nevertheless, the majority of these Systematic Literature Reviews (SLR) are mainly aimed at researchers rather than practitioners (García-Peñalvo et al., 2022) and there are many areas associated with learning outcomes (LO) in the LA research field that still need to be fully explored (Dawson et al., 2019). In the exploration of uncharted areas within educational research, it is evident that while some studies identify predictors of LO, many neglect indicators related to learning or curriculum. Current research predominantly



Example



investigación, su presencia puede abarcar todas las fases del proceso: desde la formulación de propuestas y la revisión del estado de la cuestión , hasta la redacción de artículos científicos y la difusión de resultados a la comunidad académica y a la sociedad. La prohibición de estas herramientas no resulta una estrategia realista ni eficaz. Por tanto, se hace imprescindible comprender su potencial, sus limitaciones y los principios éticos que deben guiar su integración responsable en la práctica investigadora. Este taller ofrece una reflexión crítica y práctica sobre el uso de la IA generativa en investigación, promoviendo un enfoque ético, informado y productivo.

Palabras clave: Inteligencia Artificial Generativa, Investigación académica, Ética en la investigación, Transformación digital, Comunicación científica .

Abstract -Workshop delivered at the 8th Edition of the International Conference on Innovation, Learning, and Cooperation, CINAIC 2025. Generative Artificial Intelligence has become a widely adopted tool across multiple domains, including academia, impacting all core university functions. In the research context, its influence can span every phase of the process, from proposal development and literature review to writing scientific articles and disseminating results to the academic community and society at large. Banning these tools is neither a realistic nor an effective strategy. Therefore, it is essential to understand their potential, limitations, and the ethical principles that should guide their responsible integration into research practice. This workshop offers a critical and practical reflection on the use of generative AI in research, promoting an ethical, informed, and productive approach .

Keywords: Generative Artificial Intelligence, e, Academic research , Research ethics, s, Digital transformation , Scientific communication .

Example



Learning Outcomes Evaluation Through Learning Analytics Systems in Higher Education: A Systematic Literature Review

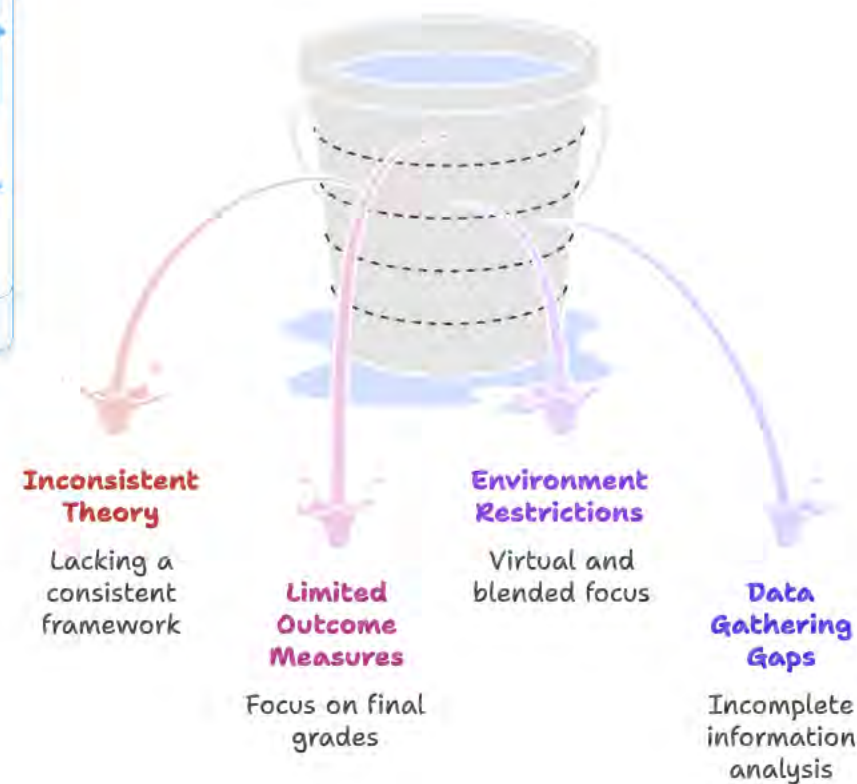
Mónica Hernández-Campos 1, Antonio Gonzalez-Torres 1, and Francisco José García-Peñalvo 2

Abstract

Learning analytics is pivotal for supporting learning, with recent research shifting from concepts to reviews. However, understanding factors influencing learning outcomes in higher education through analytics systems remains underexplored. This study aims to fill this gap, providing a holistic view of factors affecting learning outcomes in higher education through a systematic literature review. The goal is to unravel the intricate connections among factors, learning environments, research scopes, and theory. The search yielded 1,662 results, with 27 studies selected. "Engagement" emerged as the most prevalent factor, followed by "platform behavior," while "demographic features" and "self-assessment" were least prevalent. Most research focused on learning outcomes as final grades, lacking a consistent theoretical definition. Studies were mainly conducted in virtual and blended learning environments, spanning multiple courses or focusing on a single course. Despite extensive research on learning behavior and engagement in learning management systems, prevalence does not necessarily indicate a comprehensive understanding of factors influencing learning outcomes. This implies a potential gap in information gathering or analysis for deeper insights. Moreover, the lack of a consistent theoretical framework and the restriction of analyses to final or partial grades in virtual or blended learning environments suggest areas for improvement in learning analytics research. The study proposes directions for enhancing research in this field to unlock its full potential.



Unlocking Learning Outcome Insights



Example



Research Questions

The main research question is:

RQ1: What are the factors associated with learning outcomes evaluated through learning analytic systems in higher education institutions?

In addition, the following sub-questions were raised to have a comprehensive approach to the phenomena:

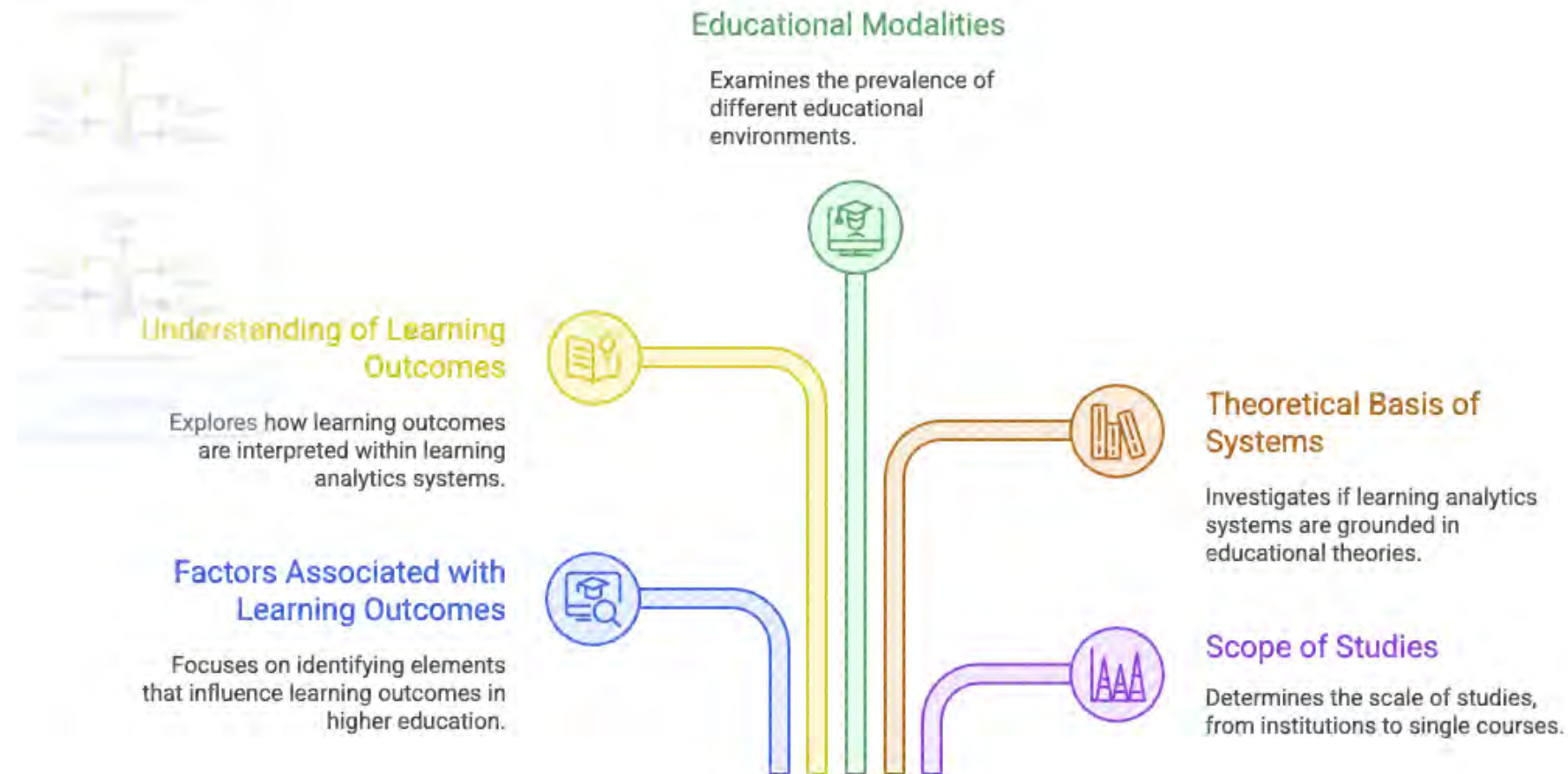
RQ2: How are learning outcomes understood in learning analytics systems?

RQ3: What are the predominant educational modalities (virtual, blended, and face-to-face environments)?

RQ4: Do the selected studies report if the learning analytic systems are based on theoretical education?

RQ5: What are the selected studies' predominant scopes (institutions, academic programs, courses, single course)?

What research questions should be addressed?



Slides generation

Goal: Create a slide deck from a paper or an outline

Example

1. Use gamma.app (<https://gamma.app/>)
2. Upload the paper or the text
3. Generate the slides

Example



Andrea's Workspace
FREE

Ir a 🔍 ⌘+K

- Gammas
- Compartido contigo
- Sitios
- Imágenes de IA

Carpetas +

Organiza tus gammas por tema y compártelos con tu equipo
[Crear o unirse a una carpeta](#)

- Plantillas
- Temas
- Fuentes personalizadas
- Papelera

- Ajustes y miembros
- Contactar a soporte
- Compartir comentarios

Gammas

Mejora tu plan para acceder a más IA ✨ 60 créditos 🔔

+ Crear nuevo AI + Nuevo gamma Importar

Todo Visto recientemente Creado por ti Favoritos

↑↓ Cuadrícula Lista

A colorful hot air balloon with vertical stripes in red, green, blue, and purple, floating above a white cloud. The basket is orange and hangs from the bottom of the balloon.

No se detectaron gammas

Intenta cambiar los filtros o ver todos los gammas.

[Ver todos los gammas](#)

Example



Crear con IA

¿Cómo te gustaría empezar?



Pegar texto
Crear un esquema o contenido existente a partir de notas
🕒 USADO POR ÚLTIMA VEZ




Generar
Crear a partir de una instrucción de una línea en unos segundos



Importar archivo o URL
Mejora documentos, presentaciones o páginas web existentes

Importar con IA

Selecciona el archivo que quieras transformar

✓ TEEM.pdf 

¿Qué te gustaría crear con este contenido?

 **Presentación**

 **Página web**

 **Documento**

 **Social**

[Continuar →](#)

Example



The screenshot displays the GRIAL interface with the following elements:

- Ajustes (Settings):**
 - Contenido del texto (Text Content):** Includes buttons for 'Generar', 'Condensar', and 'Conservar'. Under 'Cantidad de texto', 'Detallado' is selected. 'Idioma de salida' is set to 'English (US)'.
 - Visuales (Visuals):** Shows theme options: 'Basic ML' (selected), 'Stardust', and 'Canaveral'.
- Contenido (Content):** Shows a document titled 'Incorporation of AI techniques to assist with data pre-processing for non-expert users' by Marta de-Castro-Leira, Alicia García-Holgado, and Andrea Vázquez-Ingelmo. The document includes an abstract, keywords, and an introduction section.
- Instrucciones adicionales (Additional Instructions):** A text input field containing 'Opcional'.
- Consejos (Tips):** A section titled 'Forma libre' explaining that it allows expanding or reducing content by modules.
- Footer:** Shows '60 créditos', a warning about credits, a plan upgrade button, and a 'Generar' button with a '10 módulos' counter.

You can add specific instructions to the slide generation process

Customize the generative process (style, content...)

Example



Review and modify the generated content

The screenshot shows a presentation slide with a top navigation bar containing 'Tema', 'Compartir', 'Agent', and 'Presentar'. The slide is divided into two main sections. The first section, 'Literature Review Insights', features three columns of data: '78 Studies Analyzed' (from 666 initial records across Scopus and Web of Science), '40 Health & Biomedicine' (most represented application domain), and '48 Focused on Usability' (studies emphasizing ease of use). A paragraph below states that the review revealed sustained growth in AI-based preprocessing tools since 2020, with a focus on graphical interfaces and visual modules, but notes gaps in explainability, transparency, and empirical validation. An illustration of a desk with a laptop, a bar chart, and a clipboard is on the right. The second section, 'Key Techniques Identified', lists 'Data Cleaning' (using KNN, Iterative Imputation, and Random Forest) and 'Normalization' (combining range standardization with unsupervised neural reconstruction). A sidebar on the left shows a table of contents with 10 items, and a bottom right corner shows a 'Comenzar' button and a progress indicator at 100%.

Literature Review Insights

Metric	Value	Description
Studies Analyzed	78	From 666 initial records across Scopus and Web of Science databases
Health & Biomedicine	40	Most represented application domain among reviewed studies
Focused on Usability	48	Studies emphasizing ease of use and intuitive interfaces

The review revealed sustained growth in AI-based preprocessing tools since 2020, with recurring focus on graphical interfaces and visual modules. However, significant gaps remain in explainability, transparency, and empirical validation with real users.

Key Techniques Identified

Technique	Details
Data Cleaning	KNN, Iterative Imputation, Random Forest Multiple approaches for handling missing values through local estimation, boosting-based models, and decision trees
Normalization	MinMax Scaling & Autoencoder Combines range standardization with unsupervised neural reconstruction to reduce noise



Conclusions



Generative AI offers a wide range of applications throughout the entire research lifecycle. However, it is important not to overlook the implications associated with its use, especially regarding **data traceability**. At present, these tools have limitations in ensuring such traceability, which can lead to **transparency issues, difficulties in attributing authorship**, and the **generation of unverified information** (hallucinations), among other concerns



Artificial intelligence can significantly enhance our efficiency in research work, but it does not replace the essential human capacities required for investigation

We are at a point where **“AI is everywhere”** [15]. We now have access to an **extremely powerful and promising set of tools**, but **also surrounded by hype, half-truths, and considerable confusion**. Academia is not exempt from this reality **If used wisely**, AI can become a **valuable** ally for teaching, learning, and **research**. However, it is **essential to fully understand its real capabilities** and **apply critical thinking** throughout the entire process

The goal is not for it to do everything for us, nor to settle for empty answers or superficial knowledge, but rather **to use it to automate tedious and repetitive tasks**, allowing us to **focus on what truly matters: developing our creativity** and **intellectual autonomy**



Thank You

References



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2. F. J. García-Peñalvo and A. Vázquez-Ingelmo, "What do we mean by GenAI? A systematic mapping of the evolution, trends, and techniques involved in Generative AI," *International Journal of Interactive Multimedia and Artificial Intelligence*, vol. 8, no. 4, pp. 7-16, 2023. doi: 10.9781/ijimai.2023.07.006.
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AI in the Research Lifecycle



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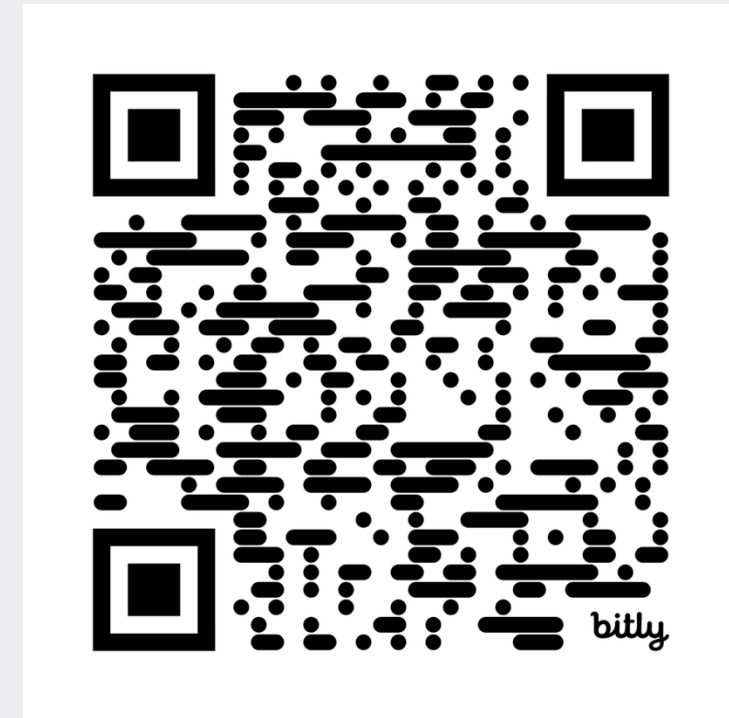
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