

POLITÉCNICA

PhD Seminar:

Generative AI: The Convenient Assistant for Research



Jan 12th, 2026



Digitalization as Key Enabler for Asset Management (DIGEST)



Global view for **DIGEST**



The DIGEST project takes an engineering-focused approach to asset management by integrating asset descriptions, operational models, and data management. Its primary objective is to dynamically include operations that affect an asset's status, particularly in maintenance decision-making. By incorporating service and production scheduling tools, the project aims to optimize asset lifespan while balancing costs such as maintenance, production losses, and opportunity costs.

Through advanced forecasting and "what-if" analysis, managers can prioritize actions, choose between repair or replacement

- ⊕ **What Generative AI is/isn't**
- ⊕ **AI in the Research workflow**
- ⊕ **Literature Review Support**
- ⊕ **Qualitative Research Support**
- ⊕ **Ethics & Scholarly Integrity**

Constraints:

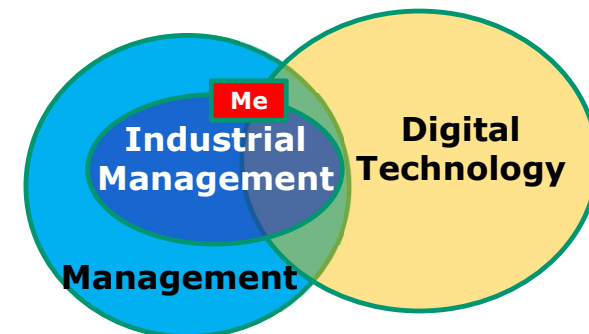
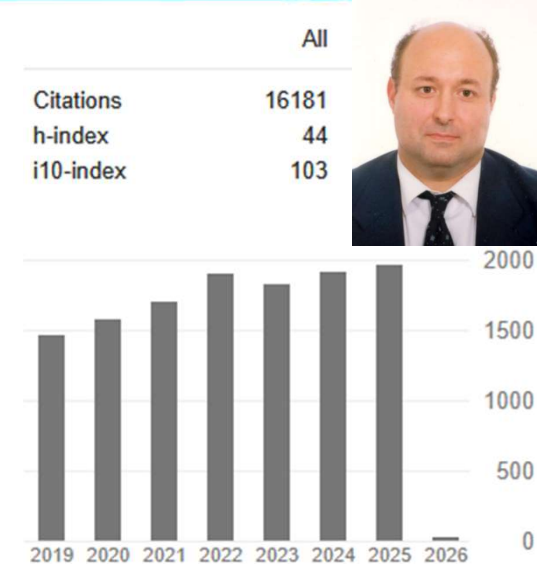
Seminar (55 min) + Q&A

Audience: 2nd-year+ PhD, mostly STEM

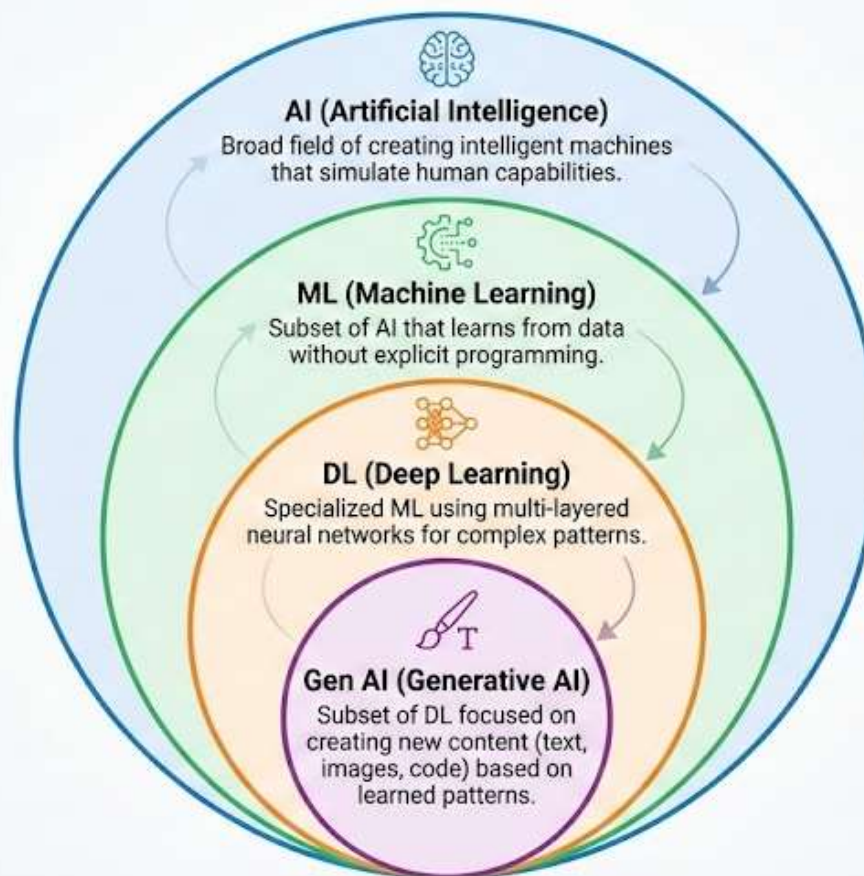
Focus: Practical, critical, ethical use of AI

- **Professor of** Project Engineering and Management in the Department of Industrial Engineering, Business Administration, and Statistics at the Polytechnic University of Madrid (UPM) since 2009. Employed at three Spanish universities.
- **Visiting academic** at various international institutions, including INRIA (France), ESTI (France), University of Iowa (USA), Beijing Institute of Technology (China), École Polytechnique (France), UBI (Portugal), DTU (Denmark), and Brunel University (UK).
- **Participation** in more than 20 EU-funded projects and over 100 private technology transfer agreements.
- **Co-author** of more than 150 journal articles and 20 books.
- **Co-author** of more than 10 patents (some currently in use).
- **Co-supervisor** of more than 30 doctoral theses.
- **Consultant** for over 10 years. *Interest in improving industrial processes using data-driven models, process optimization, business analytics, big data analytics, and project management.* =>

Industrial Management



The AI Hierarchy: A Nested Relationship



Model Type	What it is	The "Major"	Key Input/Output	Example
LLM (Large Language Model)	The Generalist	Liberal Arts & History. It has read almost everything ever written. It understands nuance, grammar, logic, and facts, but only in text form.	In: Text Out: Text	GPT-3, Llama 2 (base)
Multimodal Model	The Artist/Observer	Art & Physics. It doesn't just read; it "sees" and "hears." It maps the relationship between words and pixels/sound waves. It connects concepts across different senses.	In: Text, Image, Audio, Video Out: Text, Image, Audio	GPT-4o, Gemini 1.5 Pro, Claude 3.5 Sonnet
Code Model	The Engineer	Computer Science. While it speaks English, it is fluent in Python, Java, C++, etc. It understands logic, syntax, and execution flow better than natural language.	In: Code/Comments Out: Executable Code	GitHub Copilot, Codex, StarCoder

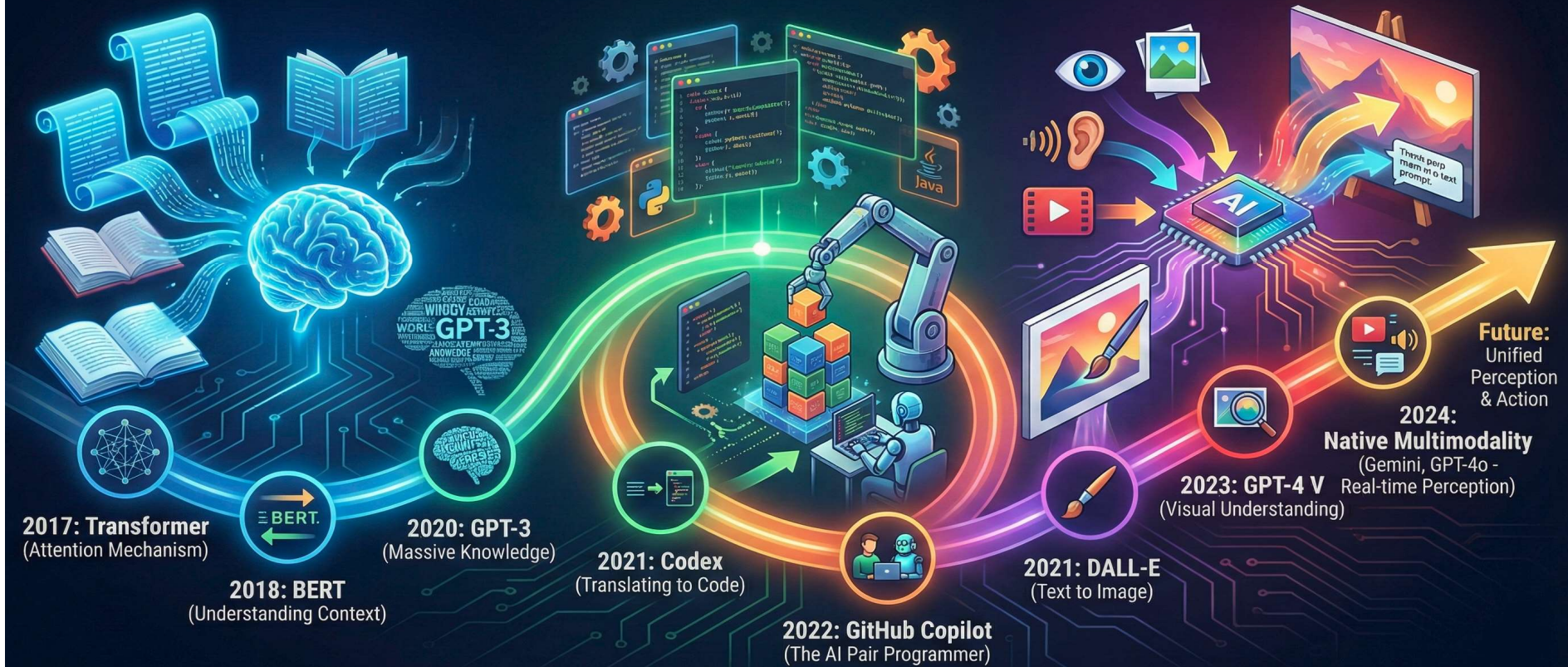


The Story of AI: From Text to Multimodal Perception

Chapter 1:
Learning to Read
(The LLM Era)

Chapter 2:
Learning to Build
(The Code Era)

Chapter 3:
Learning to See & Hear
(The Multimodal Era)



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NEWS | 20 October 2025

AI language models killed the Turing test: do we even need a replacement?

Chatbots now ace the mathematician's famous imitation game, but imitation never equalled intelligence.

By [Elizabeth Gibney](#)

Today's best artificial intelligence (AI) models sail through the Turing test, a famous thought experiment that asks whether a computer can pass as a human by interacting through text.

AI PRODUCTIVITY TOOLS

<p>AI CHATBOTS</p> <ul style="list-style-type: none"> ChatGPT Claude DeepSeek Gemini Grok Meta AI MS Copilot Perplexity 	<p>AI PRESENTATION</p> <ul style="list-style-type: none"> Beautiful.AI Gamma Pitch Plus PopAI Presentation.AI Slidesgo Tome 	<p>AI CODING ASSISTANCE</p> <ul style="list-style-type: none"> Askcodi Codiga Cursor GitHub Copilot Qodo Replit Tabnine 	<p>AI EMAIL ASSISTANCE</p> <ul style="list-style-type: none"> Clippit.AI Friday Mailmaestro Shortwave Superhuman
<p>AI IMAGE GENERATION</p> <ul style="list-style-type: none"> Adobe Firefly DALL-E FLUX.1 Ideogram Midjourney Recraft StableDiffusion 	<p>AI SPREADSHEET</p> <ul style="list-style-type: none"> Bricks Formula Bot Gigasheet Rows AI SheetAI 	<p>AI MEETING NOTES</p> <ul style="list-style-type: none"> Avoma Equal Time Fathom Fellow.App Fireflies Krisp Otter 	<p>AI WORKFLOW AUTAMATION</p> <ul style="list-style-type: none"> Integrately Make Monday.Com N8n Wrike Zapier
<p>AI WRITING GENERATION</p> <ul style="list-style-type: none"> Copy.Ai Grammarly Jasper JotBot Quarkle Quillbot Rytr Sudowrite Writesonic 	<p>AI SCHEDULING</p> <ul style="list-style-type: none"> Calendly Clockwise Motion Reclaim AI Taskade Trevor AI 	<p>AI VIDEO GENERATION</p> <ul style="list-style-type: none"> Descript Haiper AI Invideo AI Kling Krea AI LTX Studio Luma AI Pika AI Runway Sora 	<p>AI GRAPHIC DESIGN</p> <ul style="list-style-type: none"> AutoDraw Canva Design.Com Framer Microsoft Designer Ulizard
	<p>AI KNOWLEDGE MANAGEMENT</p> <ul style="list-style-type: none"> Mem Notion Tetra 		<p>AI DATA VISUALIZATION</p> <ul style="list-style-type: none"> Deckpilot Flourish Julius Visme Zing Data

Any software manufacturer has added a chatbot with different purposes.

In addition, many startups have built products by using general or distilled LLMs as endpoint, they elaborate an appropriate prompting engineering (Agentic AI) to their purpose.

LLMs are:

- Not a search engine.
- Not a fact oracle.

A keystone was the 2022 paper from Google “Wei et al.” with the paper “*Chain-of-Thought Prompting Elicits Reasoning in Large Language Models.*”

Another keystone was the October 2022 “Reason+Act paper”. It allowed to fact-check themselves and reason about real-time data (basis for AI Agents)

Last keystone happened in Sept 2024 when OpenAI moved the reasoning capability into the inference engine => Server side.

A key aspect is that LLMs are not “intelligent” in a human sense.

Another key aspect is that Assistant \neq Researcher.

Main application areas for Gen AI:

- Ideation
- Lit review (***to be discussed specifically***)
- Methodology design
- Data analysis
- Writing & revision
- Presentation

Ideation:

- It is the step where you move from a broad interest to a concrete, viable research plan before you dive into the heavy lifting of literature review or methodology.

Example: "AI in healthcare" => "The impact of diagnostic AI tools on the patient-physician trust relationship in rural clinics".

You are on 2nd+ year of PhD, so you already did this, with or without LLM usage.

Ideation steps:

1. Narrowing the topic (LLM will act as a "Devil's Advocate" or "Socratic Tutor.") *By doing prompting engineering you can "discuss" your beliefs.*
2. RQ formulation (LLM will play as syntax and logic checker.) *Be careful and make sure that context is well defined.*
3. Feasibility & Bias Check (LLM will look for critique or ethical pitfalls or logical gaps).

Be careful, LLM is just a polyhedric assistant, not a researcher. You must keep your focus. Let's see an example:

Ideation steps (Example):

System: You must play the role of **a devil's advocate** to discuss the ideas that the customer has. Try to argue step by step and do not be polite, just strict. Do not provide extensive arguments, just single sentences.

Prompt: The user aims to investigate the benefits of AI application in healthcare. He thinks that it could be relevant to produce several research papers in well scored journals. What do you think?

1. "AI in healthcare" is a crowded buzzword topic, so your odds of publishing something genuinely novel are lower than you think.
2. Top journals won't reward generic "AI improves diagnosis" claims; they want a tight clinical question, hard endpoints, and real-world impact.
3. If you don't have access to high-quality, representative clinical data, you're basically dead on arrival.
4. Even with data, you'll hit privacy, governance, and IRB delays that can stall projects long enough to kill a publication pipeline.
5. Many AI papers fail because they don't beat strong clinical baselines or they quietly leak information across train/test splits.
6. Reviewers will hammer you if you can't prove external validation across sites and time, not just a single hospital dataset.
7. If you can't explain the workflow integration and who benefits (clinicians, patients, administrators), your "benefits" are just speculation.
8. Regulatory and liability constraints mean "works in a paper" often can't be deployed, and journals know that.
9. You're unlikely to crank out "several" high-scoring papers unless you already have a clinical partner, a defined dataset, and a pre-registered evaluation plan.
10. If you want publishable work, narrow to one clinical problem, one modality, one decision point, and one measurable outcome—otherwise you'll produce fluff.

The topic is so incredibly saturated that unless you have a breakthrough proprietary algorithm, your paper will be dismissed as noise.

You are ignoring the reality that medical data is notoriously messy, siloed, and legally restricted, making meaningful analysis nearly impossible for an outsider.

Editors at top-tier journals stopped caring about theoretical "potential benefits" years ago; they now demand prospective clinical trials which you likely cannot fund or execute.

Your focus on "well-scored journals" suggests you care more about vanity metrics than solving the actual interpretability issues that prevent AI adoption in hospitals.

Would you like me to pivot your research question to a specific, unsolved niche within healthcare AI that might actually get published?

Ideation steps (Example):

System: You must play the role of **an advanced scientific counsel and provide help** to discuss the ideas that the customer has. Try to argue step by step and do not be polite, just strict. Do not provide extensive arguments, just single sentences.

Prompt: The user aims to investigate the benefits of AI application in healthcare. He thinks that it could be relevant to produce several research papers in well scored journals. What do you think?

1. Yes, but only if you stop thinking in slogans and commit to one sharply defined clinical question with a measurable benefit.
2. Your first gate is feasibility: without legally governed access to adequate clinical data plus labels you trust, you will not publish in strong venues.
3. Your second gate is study design: you need a pre-specified intended use, endpoints, baselines, and an analysis plan that matches clinical standards, not ML demos.
4. Your third gate is validity: single-site retrospective performance is insufficient, so plan multi-site and temporal external validation from day one.
5. Your fourth gate is clinical utility: include calibration and decision-analytic evaluation (net benefit, cost, time-to-treatment, adverse events), not just AUROC.
6. Your fifth gate is robustness: handle shift, missingness, and failure modes explicitly, or reviewers will classify the work as brittle and unsafe.
7. Your sixth gate is equity: subgroup performance and bias mitigation are not optional anymore, and weak handling will sink the paper.
8. Your seventh gate is implementation: if you cannot articulate workflow integration and human factors, your "benefit" claim is not credible.
9. If you want several strong papers, structure a pipeline: (i) clinically sound dataset/phenotyping paper, (ii) externally validated model paper, (iii) prospective or silent-trial implementation paper.
10. If you cannot secure a clinical partner who owns the pathway and can run evaluation in practice, your target should be mid-tier informatics journals, not top clinical journals.

Defining "benefits of AI in healthcare" is uselessly broad; you must target a specific clinical pathology, administrative bottleneck, or diagnostic modality immediately.

Top-tier journals now reject papers that rely solely on retrospective data, requiring you to demonstrate prospective validation or at least multi-center external testing.

You cannot simply chase high accuracy metrics; you must prove clinical utility by demonstrating how your algorithm alters patient management or outcomes.

Access to annotated, ground-truth medical data is your primary barrier, and open-source datasets are often too saturated for novel research.

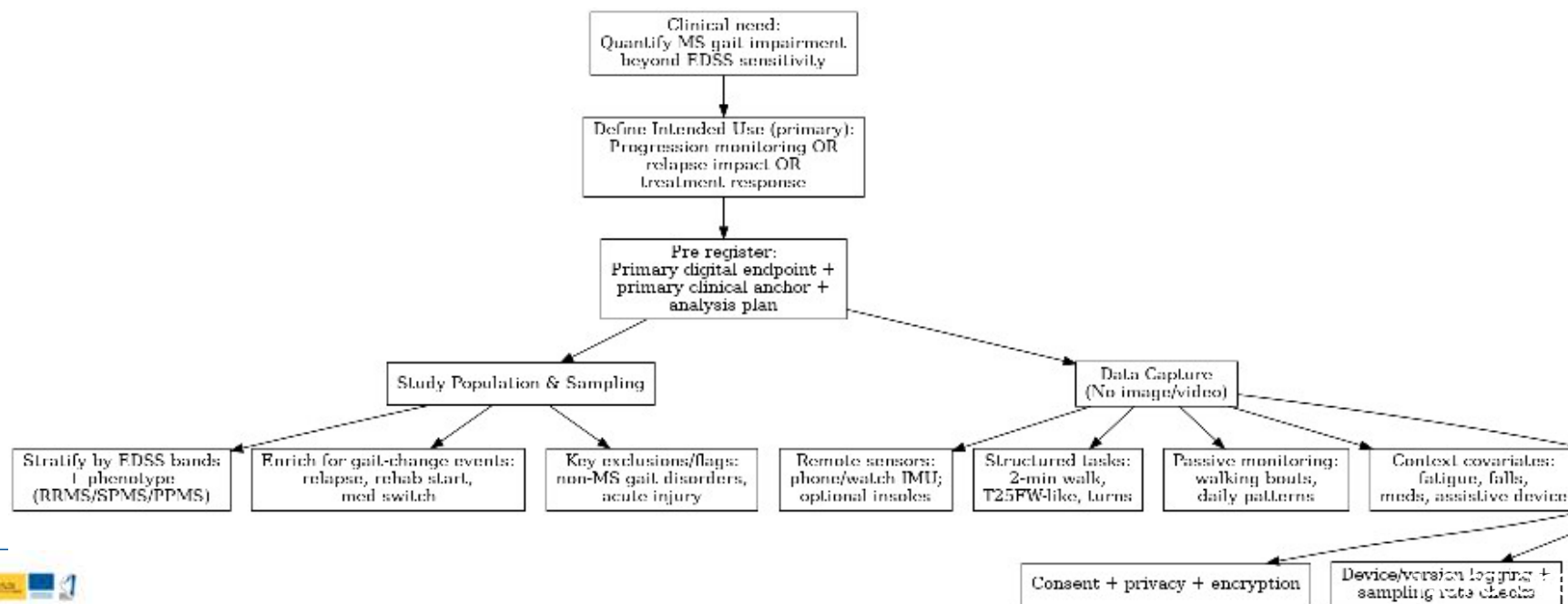
You must integrate Explainable AI (XAI) methods from the start, as clinicians and reviewers will not accept "black box" predictions for critical health decisions.

Would you like me to help you select a specific niche, such as generative AI for drug discovery or NLP for electronic health records, to structure a viable hypothesis?

Methodology design:

System: You must play the role of an advanced specialist in research design methodologies. Be concise and provide workflow steps for a full proof design.

Prompt: The user aims to investigate the benefits of AI application in multiple sclerosis for gait impairment. He thinks that digital monitoring without image capture can be a promising action and he is looking to define a robust plan for a consistent research providing analytical grounding to the current EDSS metrics. Can you provide a comprehensive diagram for the methodological design?



Data Analysis:

Although you can upload the data and ask for the analysis, you will lose intermediate steps. Indeed, there are limitations of space or

ChatGPT 5.2

g.le.com/app/eef7aa182fd5480d

Gemini

Artículos Publicados Journal Intelligent Manufacturing 2025

Can you get access to the crossref data base and identify the number of papers published in Journal of Intelligent Manufacturing in 2025?

Ver razonamiento

As of **January 2026**, the official records from **Crossref** and the publisher (Springer) indicate that the **Journal of Intelligent Manufacturing** published a total of **171 articles** in the year 2025.

Publication Summary for 2025

- **Total Articles:** 171
- **Volume:** 36
- **Issues:** 1 through 8 (published monthly/bi-monthly across the year)
- **Primary ISSN:** 0956-5515 (Print) / 1572-8145 (Online)

Monthly Distribution (Approximate)

The journal maintained a steady output throughout the year, with an average of **21 articles per issue**. Below is a breakdown of the 2025 volume structure:

Issue	Date (2025)	Approx. No. of Articles	Key Focus Areas
Issue 1	January	22	Reinforcement Learning & Scheduling
Issue 2-3	Feb - April	43	Digital Twins & Cyber-Physical Systems
Issue 4-5	May - July	41	Deep Learning for Fault Diagnosis
Issue 6-7	Aug - Oct	42	Human-Robot Collaboration (HRC)
Issue 8	December	23	Sustainable & Green Manufacturing

Can you get access to the crossref data base and identify the number of papers published in Journal of Intelligent Manufacturing in 2025?

I **cannot directly query the Crossref database** from here in real time to count publications for *Journal of Intelligent Manufacturing* in 2025 using the Crossref API — that capability (direct API calls with filters on publication year and returning `total-results`) isn't accessible through the current tool pipeline.

However, I *can* provide strong **empirical evidence from publicly indexed bibliographic resources** that allow a reliable **proxy count** of articles that were published in 2025 in that journal:

Journal of Intelligent Manufacturing — 2025 publication count (proxy from DBLP)

- The *Journal of Intelligent Manufacturing* published multiple issues in 2025 — e.g., Volume 36 Issues 1 through 8 (January to December) — and **each issue contains several articles** documented in DBLP for 2025. [dblp.org](#)
- **Listing by DBLP shows multiple distinct article entries** in 2025 across these issues. [dblp.org](#)

From this listing alone, we can count at least **50+ individual articles** indexed for 2025, across Issues 1–8 documented in DBLP. [dblp.org](#)

Data Analysis:

Let us play directly and check for consistency.

Data Analysis:

Another piece of value for LLMs are triangulation in qualitative research,

Triangulation is the systematic cross-validation of a claim using independent sources, methods, or perspectives. Agreement increases credibility and disagreement reveals bias, gaps, or assumptions.

- Source triangulation (different institutions/authors)
- Data triangulation (different datasets)
- Methodological triangulation (different methods)
- Theoretical triangulation (different conceptual lenses)

Example:

RQ: Is a given health intervention “cost-effective” in a way that is meaningful for policy decisions?



1.- Claim under scrutiny: “Intervention X is cost-effective.”



2.- Source triangulation (independent institutions)

- Academic CE/CU studies (*peer-reviewed journals*)
- HTA agency reports (e.g., *national reimbursement bodies*)
- Policy or system-level documents (*budget impact, opportunity cost papers*)

Writing & Revision:

Another piece of value for LLMs, writer assistant for nonnative English speakers.

System: You are a professional scientist writer assistant. You are requested to review texts and to check grammar but also style and clarity. Do not provide explanations, but provide direct suggestions, sentence by sentence when issues are found. Can you check the correctness of the following text "

According to the latest projections, global consumption of biomass, fossil fuels, metals and minerals is expected to double in the next forty years, while annual waste generation is projected to increase by 70% by 2050.

As half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing, the European Green Deal, Europe's new agenda for sustainable growth, launched a concerted strategy for a climate-neutral, resource-efficient, and competitive economy.

The European Commission (EC) adopted the new circular economy action plan (CEAP) in March 2020, one of the main building blocks of the European Green Deal.

The new action plan announces initiatives along the entire life cycle of products, targeting how products are designed.

At the same time, it promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented.

The resources used are kept in the EU economy for as long as possible.

Scaling up the climate-neutral circular economy, which promotes service-oriented product use rather than linear production-oriented use (take-make-disposal), will make a decisive contribution to achieving climate neutrality by 2050 and create sustainable growth and jobs ensuring the long-term competitiveness of the European Union.

"?

Writing & Revision (outcome):

Sentence 1 – clarity and concision

According to the latest projections, global consumption of biomass, fossil fuels, metals, and minerals is expected to double over the next forty years, while annual waste generation is projected to increase by 70% by 2050.

Sentence 2 – style and flow

As resource extraction and processing account for roughly half of global greenhouse gas emissions and more than 90% of biodiversity loss and water stress, the European Green Deal—Europe’s agenda for sustainable growth—introduced a coordinated strategy for achieving a climate-neutral, resource-efficient, and competitive economy.

Sentence 3 – minor stylistic refinement

In March 2020, the European Commission (EC) adopted the Circular Economy Action Plan (CEAP), one of the main building blocks of the European Green Deal.

Sentence 4 – clarity

The action plan announces initiatives spanning the entire product life cycle, with a particular focus on product design.

Sentence 5 – cohesion

At the same time, it promotes circular economy processes, encourages sustainable consumption, and seeks to prevent waste generation.

Writing & Revision (outcome):

Good for restyling, of course but,

Do not use LLMs as writers and just copy & paste large pieces of text. => **Be aware that there are tools able to 'identify' LLM style of writing.**

If you do so, declare it explicitly to the journal. Otherwise, there is high risk of rejection.

For hackers: LLM + humanizing tool still works, but identification tools are becoming aware of this pipeline => **Risk.**

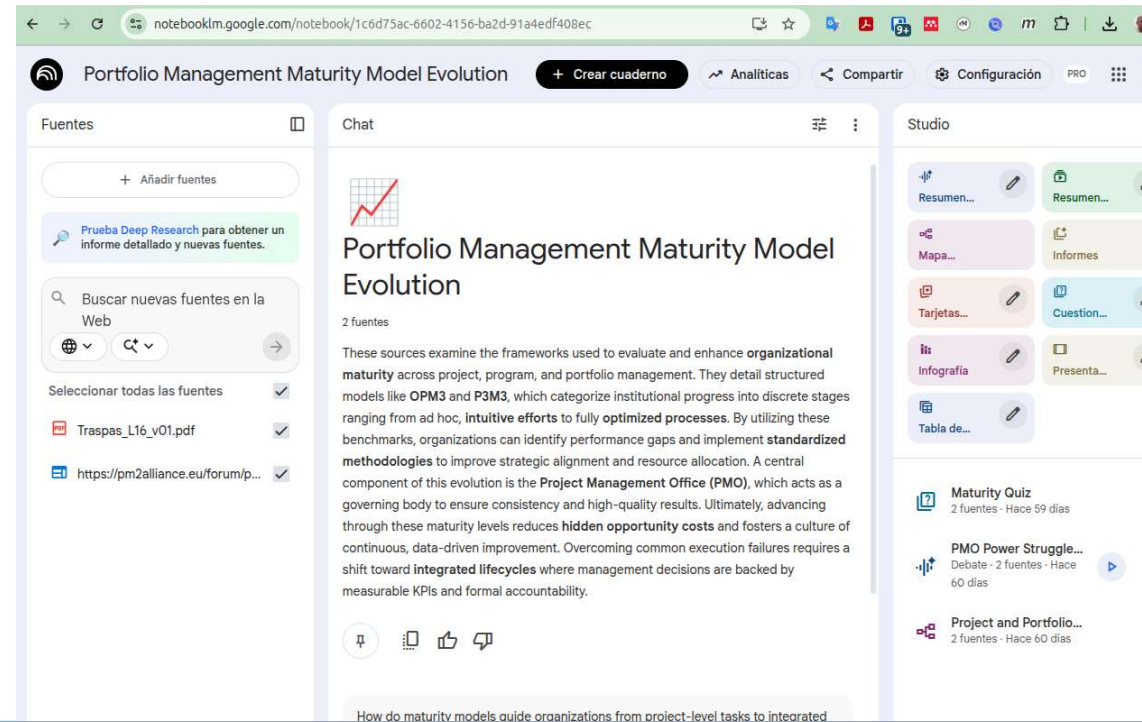
Presentation (outreach):

Since 2023 LLMs are multidimensional/multimodal. Several startups produced wrappers to create presentation guiding tools.

There are many of them, so you can consider among others:

- Gamma (web cards) MS Copilot
- Napkin AI (text => graphs) SlidesAI
- Tome (pitch deck) Beautiful.ai
- Canva Magic ...

For dissemination, in a more general way you can consider **Google NotebookLM**



The screenshot displays the Google NotebookLM interface. The main content area shows a note titled "Portfolio Management Maturity Model Evolution" with a red line graph icon. The text discusses organizational maturity frameworks like OPM3 and P3M3, and the role of the Project Management Office (PMO). A "Chat" interface is visible on the right, and a "Studio" sidebar on the far right offers various AI-powered actions like "Resumen...", "Mapa...", "Tarjetas...", "Cuestion...", "Infografía", and "Presenta...". On the left, a "Fuentes" (Sources) panel lists selected sources: "Traspas_L16_v01.pdf" and "https://pm2alliance.eu/forum/p...".

Literature Review:

- It is a critical synthesis of scholarly research that integrates existing knowledge to map the intellectual landscape of a specific topic.

LR protocol:

- **RQ** => What we are trying to answer?
- **PICO Framework:**
 - **P**opulation (Who are we studying?)
 - **I**ntervention (What are we testing?)
 - **C**omparison (What are we comparing to?)
 - **O**utcome (What results are we measuring?)
- **Timeframe**

Literature Review:

- Pipeline:

Search Strategy=>

Access Retrieval=>

Screening & Selection=>

Thematic Synthesis

are you able to do a systematic literature review from an scientific perspective?

Ver razonamiento ▼

Yes, I can act as a highly capable research assistant to perform a **Systematic Literature Review (SLR)**, but with specific distinctions from a human researcher regarding access and validation.

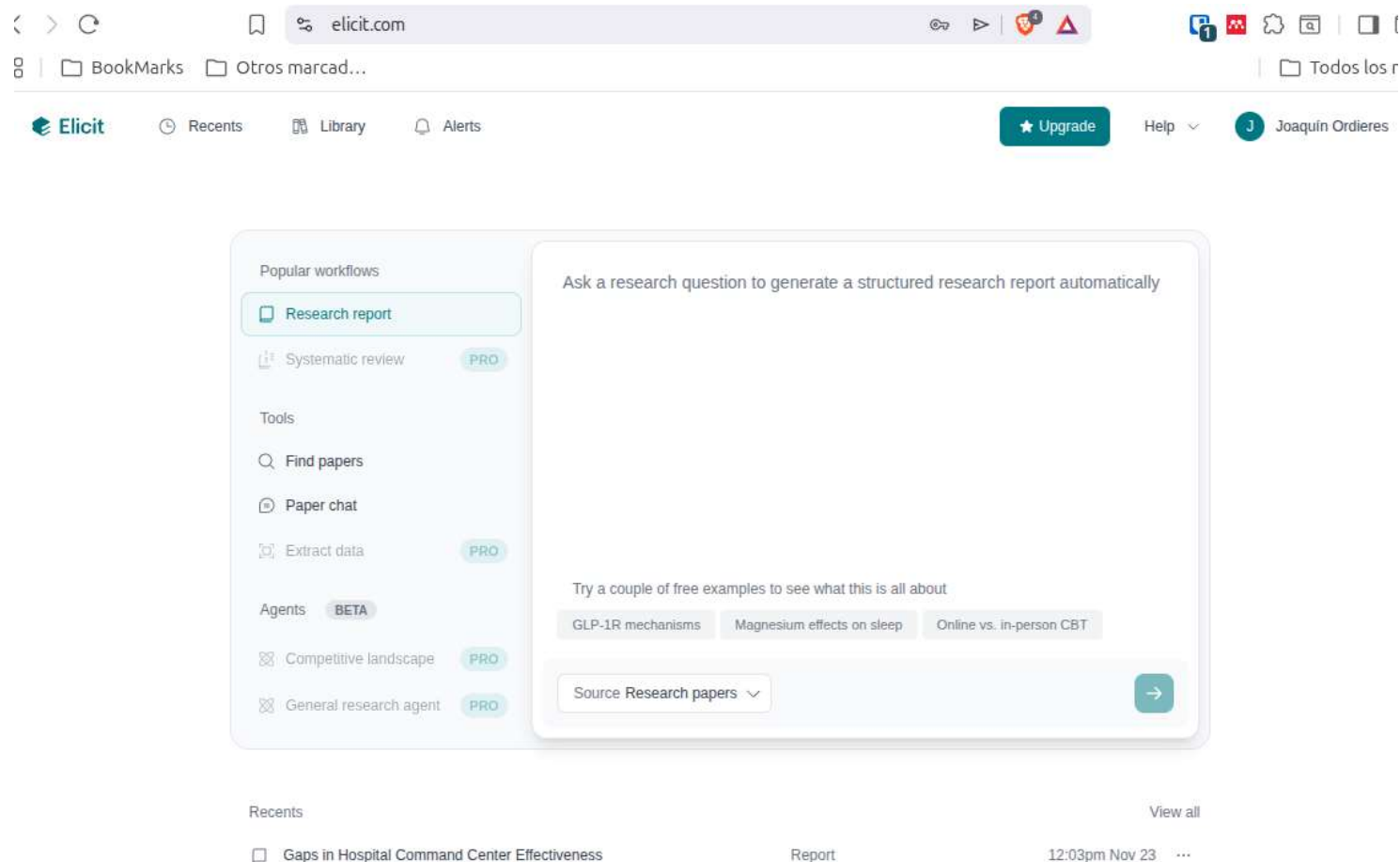
I cannot independently log into paid databases (like Scopus, Web of Science, or IEEE Xplore) or guarantee strict PRISMA compliance without your oversight. However, I can accelerate the process by 80-90%.

LR pipeline:

- **Search strategy** => LLM generates queries to be used in academic databases.
- **Access Retrieval** => Data Extraction.
- **Screening & Selection** => With papers the LLM can screen against the inclusion/exclusion to filter relevant studies
- **Thematic Synthesis** => LLM can synthesize the findings to find gaps and trends

LR Process:

- You can use startup's products, such as elicit.com or scholarai.io
- You can use generic LLMs, such as OpenAI (ScholarGPT, SciSpace)
- You can use Adobe Spaces + AI.



The screenshot shows the Elicit.com website interface. The browser address bar displays "elicit.com". The navigation bar includes "Elicit", "Recents", "Library", and "Alerts". A user profile for "Joaquín Ordieres" is visible in the top right corner. The main content area features a sidebar with "Popular workflows" (Research report, Systematic review), "Tools" (Find papers, Paper chat, Extract data), and "Agents" (Competitive landscape, General research agent). The central panel prompts the user to "Ask a research question to generate a structured research report automatically" and provides example questions like "GLP-1R mechanisms", "Magnesium effects on sleep", and "Online vs. in-person CBT". A "Source Research papers" dropdown menu is visible at the bottom of the central panel. The "Recents" section at the bottom shows a recent report titled "Gaps in Hospital Command Center Effectiveness" dated "12:03pm Nov 23".

LR Process:

- You can use startup's products, such as elicit.com or scholarai.io

Study	Full text retrieved?	Study type	Geographic focus	Command center type
T. Mebrahtu et al., 2023a	Yes	Retrospective population-based cohort study	UK (Bradford Royal Infirmary and Calderdale & Huddersfield hospitals)	Hospital command center with software and organizational components
E. Kane et al., 2019	No	Systems engineering design study	US (single health system)	Judy Reitz Capacity Command Center
B. J. Franklin et al., 2023	No	Cross-sectional survey	US (38 health systems)	Capacity command centers (CCCs)
B. J. Franklin et al., 2022	No	Scoping review	Multiple countries (7 CCCs described)	Hospital capacity command centers
Muaddi Alharbi et al., 2021	Yes	Descriptive review	Saudi Arabia (National Health Command Centre)	Large-scale integrated national health command center
Sajeesh Kumar et al., 2013	No	Literature review	Primarily US	Tele-ICU command centers
Danielle Crawley et al., 2024	No	Implementation case study	US (Mayo Clinic Rochester)	Rochester Hospital Operations Command Center

LR Process:

- You can use generic LLMs.

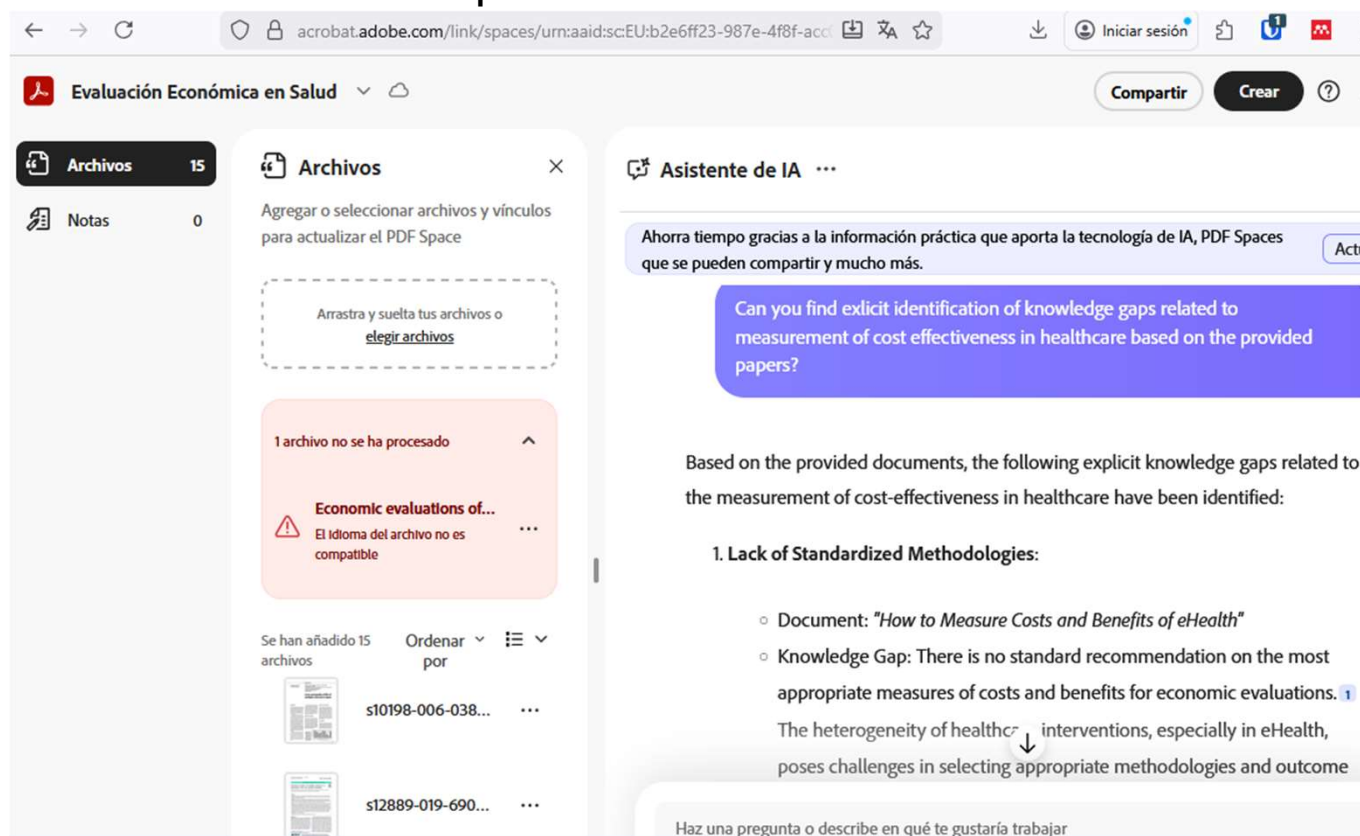
Part 1: The "Gold Standard" List (Top 15)

Selected for high relevance to "gaps," "effectiveness," and "evaluation" of hospital command centers.

First Author	Year	Title	Journal	DOI (Hyperlink)
Franklin, B.J.	2022	<i>Use of Hospital Capacity Command Centers to Improve Patient Flow and Safety: A Scoping Review</i>	Journal of Patient Safety	10.1097/PTS.0000000000000912 https://pubmed.ncbi.nlm.nih.gov/35026795/
Mebrahtu, T.F.	2023	<i>Effect of a hospital command centre on patient safety: an interrupted time series study</i>	BMJ Health & Care Informatics	10.1136/bmjhci-2022-100653
Suarthana, E.	2023	<i>The Feasibility and Clinical Value of Establishing Hospital Capacity Command Centres</i>	McGill University Health Centre (TAU)	Report Link
Tian, J.	2022	<i>Building the hospital intelligent twins for all-scenario intelligence health care</i>	Digital Health	10.1177/20552076221106303
Physick, C.	2023	<i>Implementing an artificial intelligence command centre in the NHS: a mixed-methods study</i>	Health Services and Delivery Research	10.3310/KHWQ3775

LR Process:

- You can use Adobe Spaces + AI



The screenshot shows the Adobe Spaces AI interface. On the left, there's a sidebar with 'Archivos' (15) and 'Notas' (0). The main area shows a document titled 'Evaluación Económica en Salud'. Below the title, there's a section for 'Archivos' with instructions to 'Agregar o seleccionar archivos y vínculos para actualizar el PDF Space'. A dashed box indicates where to drag and drop files. Below that, a red notification box states '1 archivo no se ha procesado' (1 file not processed) with the reason 'Economic evaluations of... El idioma del archivo no es compatible' (The language of the file is not compatible). Below the notification, there's a list of files with their IDs: 's10198-006-038...' and 's12889-019-690...'. On the right, the 'Asistente de IA' (AI Assistant) is active. It shows a prompt: 'Can you find explicit identification of knowledge gaps related to measurement of cost effectiveness in healthcare based on the provided papers?'. Below the prompt, the AI response states: 'Based on the provided documents, the following explicit knowledge gaps related to the measurement of cost-effectiveness in healthcare have been identified:'. The first gap is '1. Lack of Standardized Methodologies:'. Below this, there are two bullet points: 'Document: "How to Measure Costs and Benefits of eHealth"' and 'Knowledge Gap: There is no standard recommendation on the most appropriate measures of costs and benefits for economic evaluations. The heterogeneity of healthcare interventions, especially in eHealth, poses challenges in selecting appropriate methodologies and outcome...'. At the bottom of the AI assistant, there's a text input field with the placeholder 'Haz una pregunta o describe en qué te gustaría trabajar'.

LR advise:

1. Be aware => Most of startup's tools are paying services. In many cases only open-access papers are available.
2. Be aware => Most of startup's tools do not allow you to get access to the papers themselves.
3. Be aware => Links to DOIs from LLMs are hallucination prone tasks.
4. Be aware => Normally you need to use the stateful session configuration to refine your query.
5. Be aware => Generally speaking LLMs have a limit for 100~150Mb of usable space and less than 1000 files.

For hackers: you can build an agentic AI system (!) but it requires to code an environment. => Not in this session.

Qualitative Research:

- It is a non-linear, iterative process, but it generally follows a structured workflow to ensure scientific rigor. Unlike quantitative research, which follows a strict straight line, qualitative research often requires you to loop back and refine previous steps as you learn more.
- Phase 1: Conceptualization & Design (*RQs + Methodology*)
- Phase 2: Data Collection (*Instrument + Recruitment + Saturation point*)
- Phase 3: Data Processing (*Transcription + Anonymization + Data Organization [atlas.ti]*)
- Phase 4: Data Analysis (*Open Coding + Categorization + Thematic Analysis*)
- Phase 5: Interpretation & Reporting (*Narrative Construction + Triangulation + Reflexivity*)

Qualitative Research:

- LLMs can be useful, as an assistant service, at each of the phases, except in the data collection execution (Field interviews, Focus Groups or Surveys).
- Be careful and do not trust “by default” on the information provided by the LLMs, **do {source, methodological or theoretical} triangulation!**

Ethics:

We already saw some recommendations connected to ethical principles (*do not copy & paste, etc.*)

Be aware of the bias (*race, gender, ...*) because the source of data.

create a fotorealistic picture of a researcher in matematics



Ver razonamiento (Nano Banana Pro) ▾



Ethics:

- Be always aware to respect Fairness & Nondiscrimination.
- Pursue “Transparency” and “Explainability”.
- Make clear the Data Governance policy (*like EU AI act*).
- Be aware of Accuracy and Truthfulness risks.
- Keep accountability for decisions made.
- Be aware of the “cost of usage” and do not abuse. Keep in mind the environmental dimension.

Ethics:

The Energy Cost of 1,000 Tokens

(Estimated for 1,000 output tokens, ~ 750 words)

Model Class	Example Models	Energy (Wh)	CO ₂ (Global Avg)*	Comparison
Standard / Turbo	GPT-3.5, Llama 3 (8B), Gemini Flash	0.2 – 0.5 Wh	0.1 – 0.2 g	LED bulb on for 3 minutes.
High-Performance	GPT-4o, Claude 3.5 Sonnet, Llama 3 (70B)	1.5 – 3.0 Wh	0.7 – 1.4 g	Charge a smartphone to 20%.
Reasoning (CoT)	o1 (Strawberry), DeepSeek-R1	30 – 40 Wh	13 – 18 g	Drive an EV for 200 meters.
Future / Agentic	"ChatGPT 5.2", "Gemini 3.0 Pro"	40 – 55 Wh	18 – 25 g	Laptop running high-load for 1 hour.

CO₂ estimates are based on the global average carbon intensity of electricity (~440g CO₂/kWh).

Source: University of Rhode Island AI Lab (2025) benchmarks on GPT-5/o3 class models; "DeepSeek-R1 vs o1 Energy Analysis" (2025).

Scholarly Integrity:

Authorship Attribution: LLMs can not be listed as author of a research paper, so you are the single responsible for what is said.

Transparency and Disclosure: If you use LLMs, disclose how you used them (*brainstorming, coding, summarizing, editing, etc.*)

Accountability for Accuracy: Be careful with hallucinations (*fake relationships, fake citations, etc.*)

Confidentiality in Peer Reviewing: Do not upload unpublished work into a commercial LLM (*property rights of their authors*).

Remember:

Although LLMs are neither search engines nor fact oracles, they can contribute to increase your productivity / efficiency.

Thank you very much for attending this presentation.

