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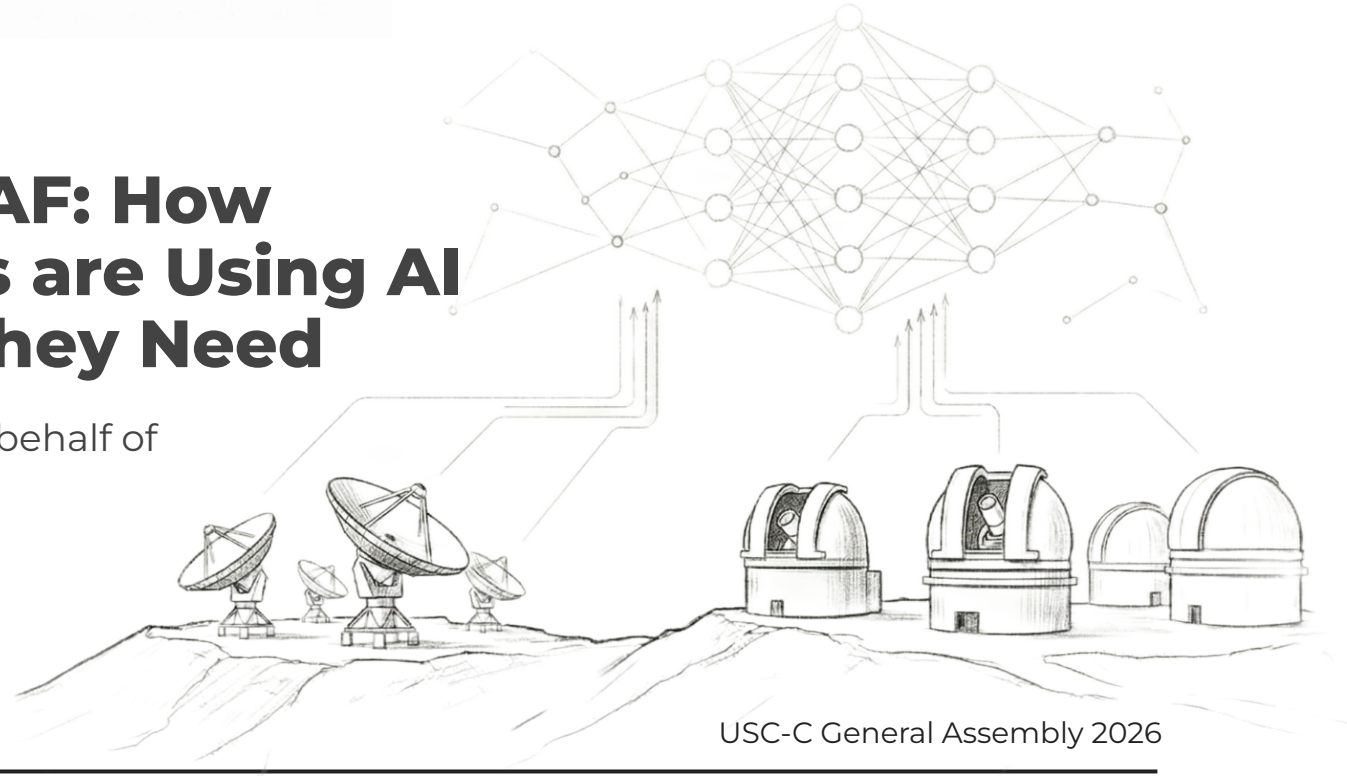
Gen.IA
I.A. generativa in INAF

GenAI at INAF: How Researchers are Using AI and What They Need

Alessandro Cabras, on behalf of
the GenIA group



USC-C General Assembly 2026

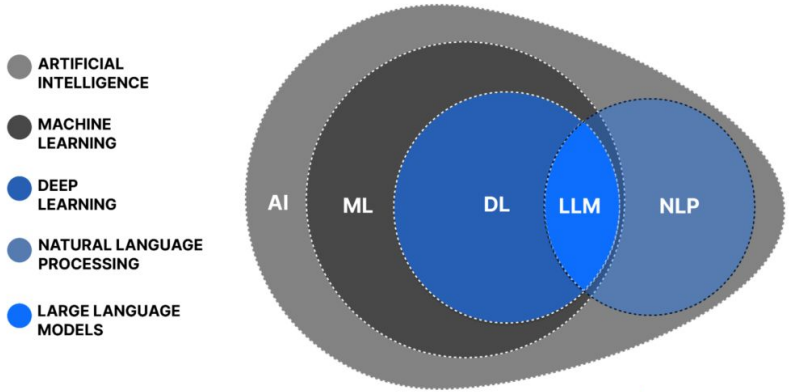
The Generative AI Paradigm Shift: What is an LLM?

Large Language Models (LLMs) are advanced neural networks trained on vast datasets to predict, translate, and generate human-like text.

Natural language is the new universal programming language. Complex computational tasks can now be executed through conversational prompts.

We are transitioning from *Information Retrieval* (finding existing answers) to *Cognitive Automation* (generating drafts, code, and structured ideas from scratch).

AI is no longer just a tool for analyzing data; it has become an active assistant in the creative and problem-solving process.



The Survey (Origin, Goals, and Structure)

Promoted and designed during Spring 2025 by the INAF GenIA Group, a thematic working group of the USC-C, which currently gathers **~55 participants**.

The Goal: To analyze how INAF staff actually uses GenAI in order to:

- Propose targeted preparatory and training activities.
- Shape effective institutional policies.
- Justify the formal request for enterprise AI licenses.

Questionnaire Structure: A comprehensive framework exploring four main dimensions:

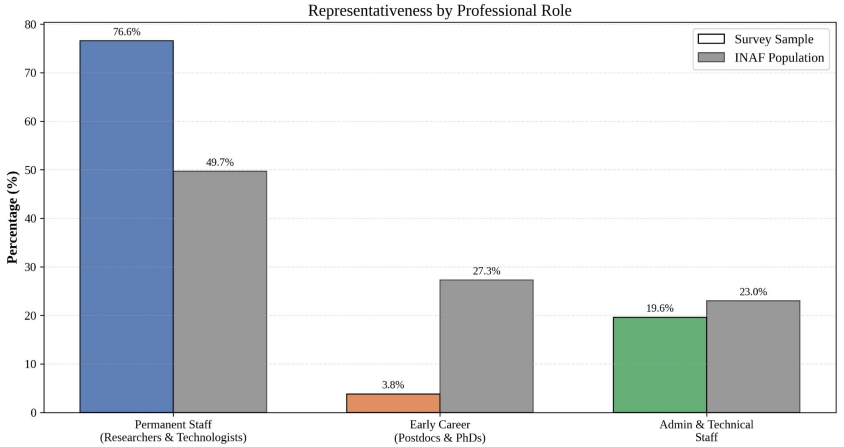
- *Adoption & Tools:* Frequency of use, preferred platforms, and funding methods.
- *Use Cases:* Specific applications (Coding, Writing, Brainstorming, Evaluation).
- *Skills & Literacy:* Self-assessed competence and prompt engineering skills.
- *Barriers & Ethics:* Trust issues, hallucinations, and requests to the institution.

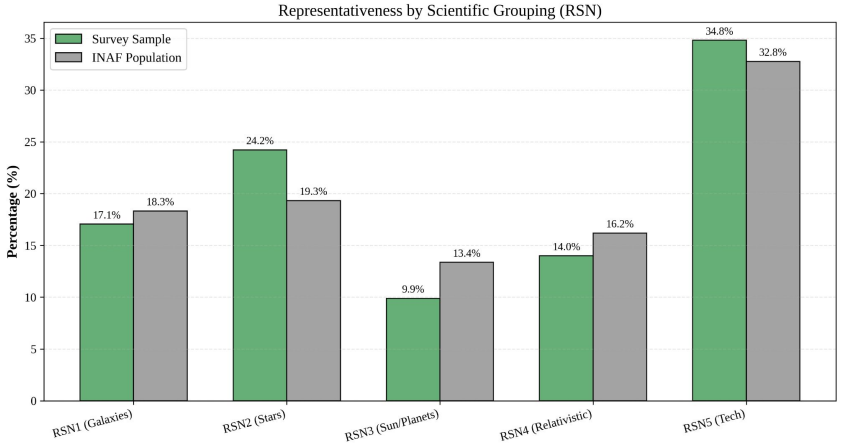
Demographic Distribution

High Participation: 371 valid responses, representing ~20% of the active INAF workforce.

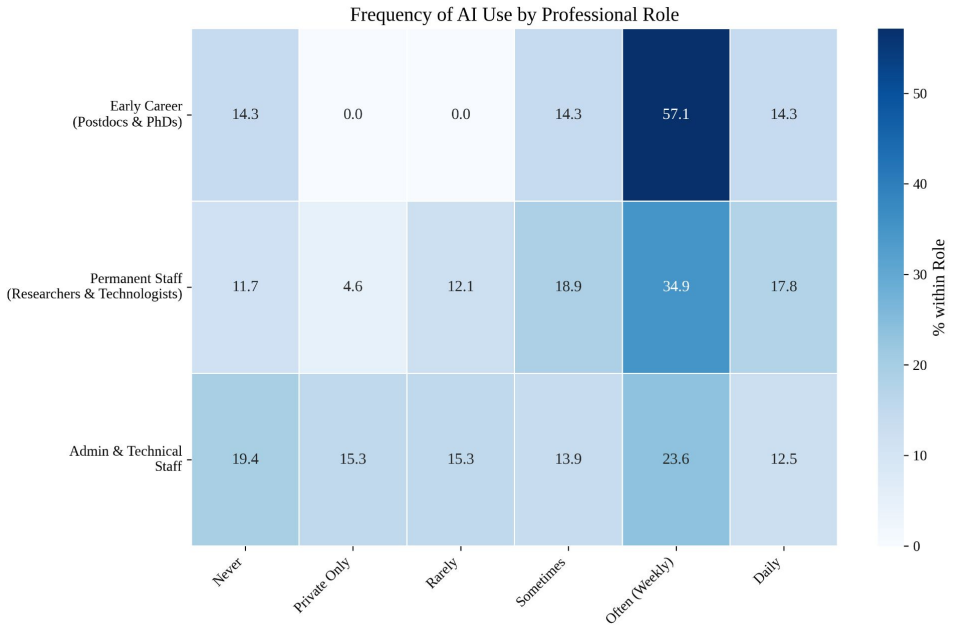
Role Distribution: Accurate reflection of the INAF population across Permanent Staff, Administrative, and Technical personnel.

Scientific Groupings: Strong alignment with the institute's diversity across all RSNs.





Adoption Rates and Frequency of Use



~50% of all respondents actively use AI tools on a weekly or daily basis.

Early Career: PhDs and Postdocs are the leading adopters.

Staff: Permanent Staff shows a strong adoption curve.

Admin & Tech: Lower average frequency in these roles reflects structural constraints, not reluctance:

- *Technical Staff:* Strong focus on hardware engineering and specialized laboratory operations (where text-based AI is currently less impactful)
- *Administrative Staff:* Strict regulatory environments where "legal hallucinations" pose severe institutional risks.

GenAI Usage at INAF

45.8%

Software Development

Primary driver of adoption. Heavily used for boilerplate code, debugging, and testing.

Massive speed boost, but requires strict expert supervision to catch "logical hallucinations".

38.8%

Academic Writing

Acts as a "great equalizer" for non-native English speakers.

Dominant use is linguistic verification (21.6%) and stylistic refinement (17.2%), not drafting from scratch (only ~9%).

26%

Scientific Brainstorming

Used for lateral thinking, clarifying ideas, and exploring alternative approaches.

Lower hallucination anxiety: users seek a dialogue, not strict factual precision.

56.2%

Day-to-day Bureaucracy

A baseline tool for routine tasks: drafting emails, translating, and summarizing documents.

When these tasks cross into formal administration, invented regulatory references (legal hallucinations) pose severe risks.

Primary Use Cases: Quality vs. Speed

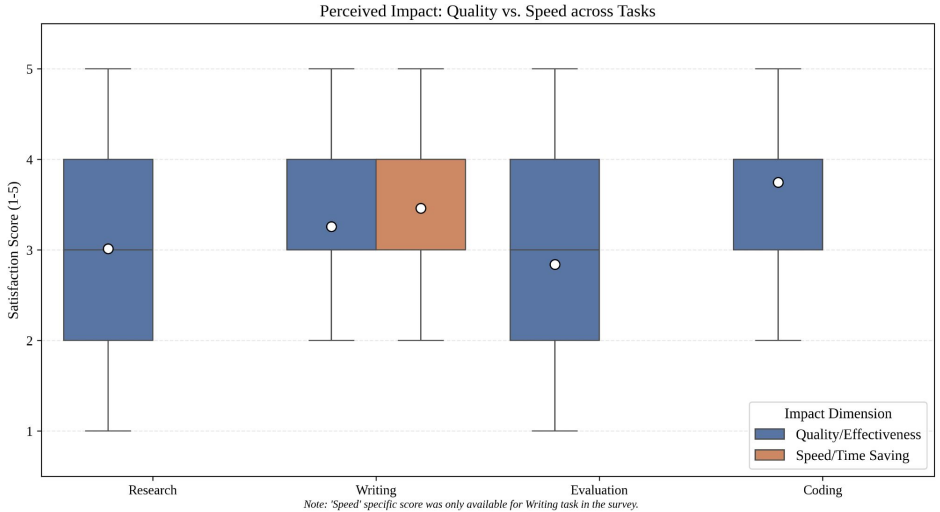
AI is primarily valued for saving time rather than improving absolute quality.

Coding and Scientific Writing are the most impacted workflows.

Writing Task Divide: While the overall distribution is similar, the *mean satisfaction* is higher for Speed than for Quality.

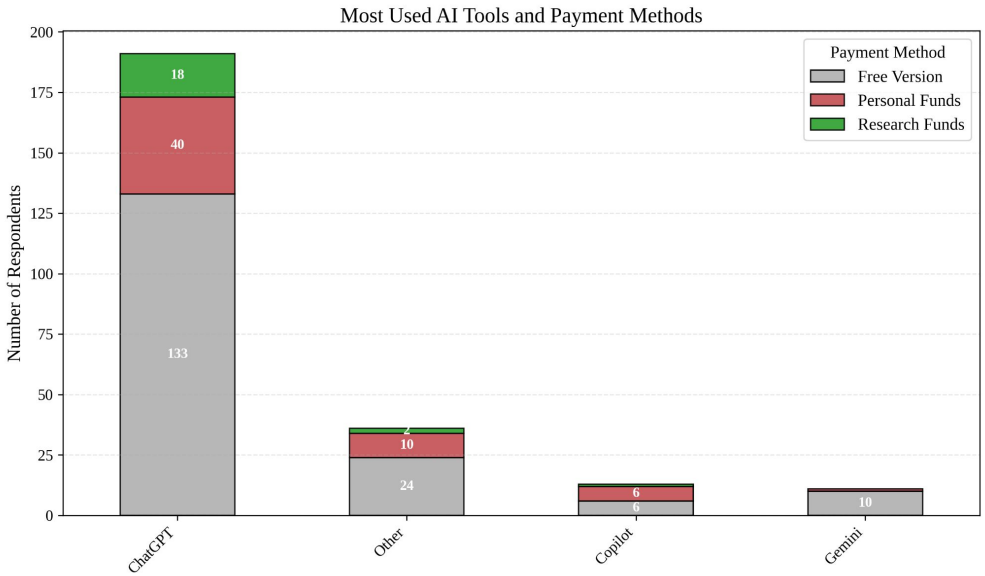
Evaluation & Research: Lower impact scores, indicating that critical thinking and domain expertise cannot (yet) be outsourced.

GenAI acts as a powerful efficiency booster for repetitive tasks, not as a replacement for scientific rigor.



Theme	Representative Quote (Original User Feedback)
Linguistic Equity	*"It is very useful for reviewing texts written in English, suggesting synonyms, and checking grammar.* ***It speeds up the writing process significantly.****"*
Coding Efficiency	*"I asked for a Python script to plot a specific dataset... it wrote 90% of the code correctly in seconds, leaving me only the refinement work.* ***It acts like a junior programmer.****"*
Shadow IT / Cost	*"I personally pay for the subscription because the* ***free models are not capable of complex reasoning****. Institutional access to advanced models (e.g., GPT-4) is necessary."*
Skepticism/Risk	*"I asked for a bibliography on planetary habitability. It produced a list of plausible-sounding but completely non-existent papers.* ***It invented the citations.****"*
Administrative Tasks	*"I asked it to draft a formal bureaucratic email regarding a procurement procedure.* ***It set it up flawlessly, even including the correct regulatory references.****"*
Brainstorming	*"I use it to clarify my ideas.* ***Even if the answer is wrong, the dialogue forces me to better structure my own reasoning****. It's useful for finding connections I hadn't thought of."*

The Toolkit and the “Shadow IT” Phenomenon



ChatGPT strongly dominates the landscape, followed by Copilot.

Advanced scientific work often requires premium, paid models.

A significant portion of staff pays out-of-pocket for AI tools to maintain competitiveness (18.6%).

Equity: Access to top-tier tools depends on personal financial capacity.

Security: Unregulated upload of scientific data to personal accounts.

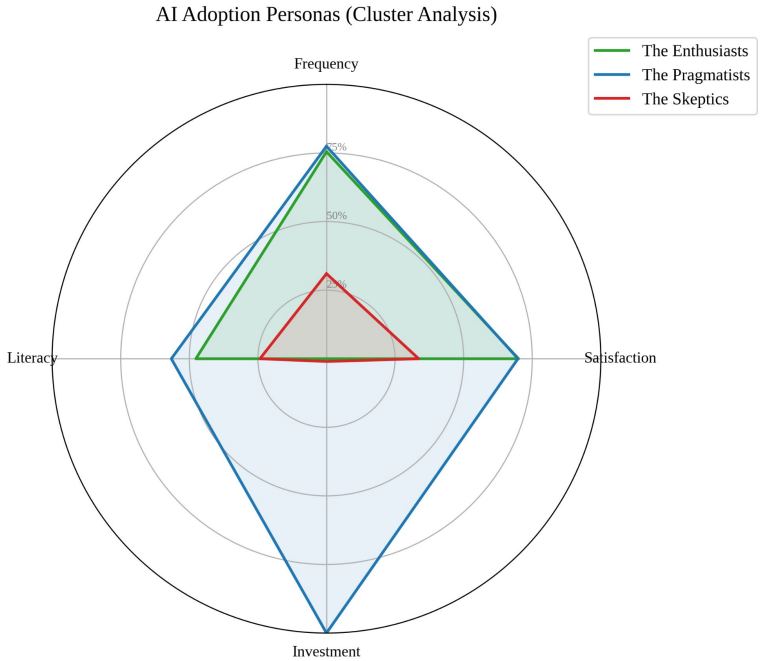
The lack of enterprise licenses forces researchers into a grey area.

User Personas: The Hidden Digital Divide

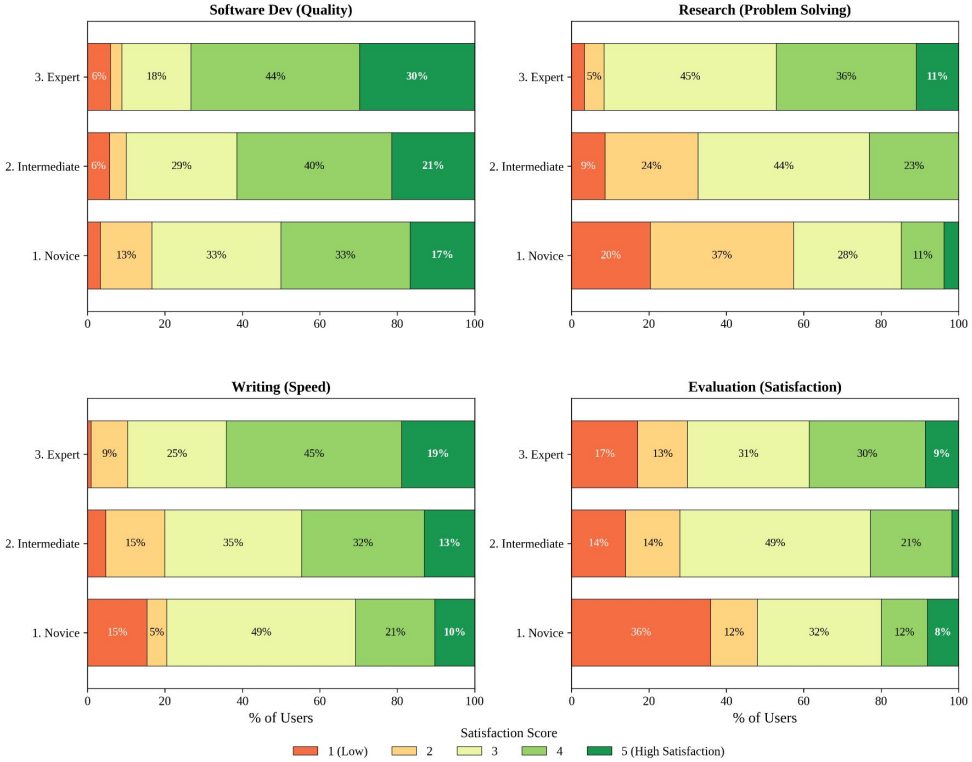
K-Means clustering identifies 3 distinct adoption archetypes.

- **The Enthusiasts (18%):** High usage, high literacy, and the only group actively investing *personal funds* for premium models.
- **The Pragmatists (49%):** Statistically similar to Enthusiasts in *frequency* and *satisfaction*, but strictly reliant on free tools.
- **The Skeptics (33%):** Low usage, lowest satisfaction, and lowest AI literacy.

The barrier to advanced adoption is not cultural resistance (Pragmatists are ready!), but lack of institutional resource access.



Barriers and the Literacy Gap



AI effectiveness is heavily dependent on the user's technical competence (Prompting, iteration, bias awareness).

Across all four core tasks, self-assessed "Experts" report significantly higher satisfaction (green bars) compared to "Novices".

GenAI is not a plug-and-play solution; poor inputs directly generate poor outputs, fueling skepticism.

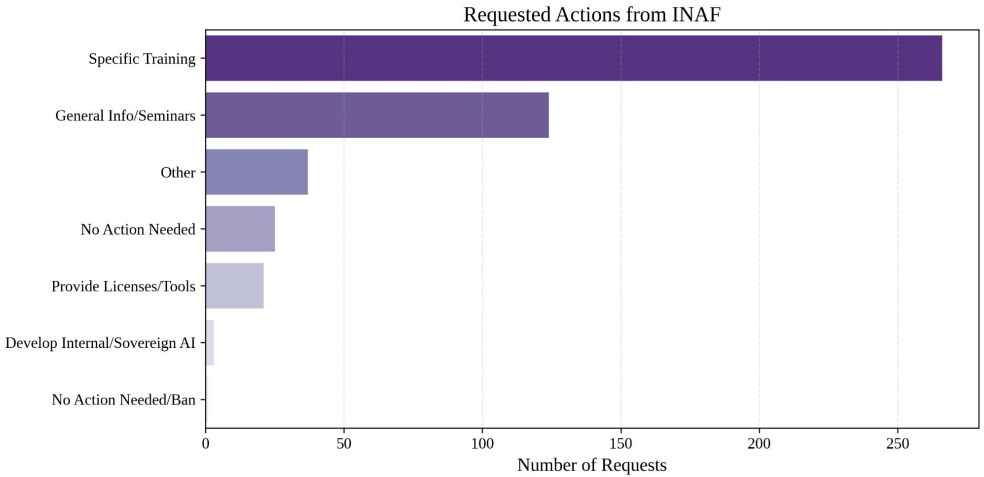
The primary obstacle to widespread, high-quality adoption is the lack of specific training, rather than ideological rejection.

Institutional Roadmap and Future Outlook

Top 3 Requests from the Workforce:

1. **Specific Training:** Technical workshops on advanced prompting and AI limits, not just general webinars.
2. **Premium Licenses:** Centralized provision of premium, privacy-compliant AI tools to kill "Shadow IT".
3. **Clear Guidelines:** Best practices for citing AI usage in papers and evaluating AI-assisted proposals (avoiding restrictive bans).

The INAF community is asking for governance and support, not prohibition.



Institutional Roadmap and Future Outlook II

INAF has recently provided access to a secure version of Gemini, guaranteeing strict data confidentiality and privacy-compliant AI assistance, alongside a number of premium Gemini Pro licenses.

The GenIA group launched targeted technical and ethical seminars. The inaugural event demonstrated massive demand, peaking at **~360 participants**.

The 2026 Training Framework: A comprehensive pipeline of upcoming specialized courses:

- *GenAI Foundations* (New basic course)
- *GenAI for Administration & Public Outreach*
- *Advanced Tech:* AI Agents and RAG (Retrieval-Augmented Generation)

Ongoing strategic dialogue with CINECA to leverage national computing resources for hosting local, privacy-compliant LLMs.

Networking as a group to participate in GenAI-driven projects.

Conclusions

Adoption is a Reality: 50% of staff already use GenAI weekly.

Efficiency First: GenAI is currently a powerful time-saver, not a substitute for scientific excellence.

The Hidden Divide: We must address the "Shadow IT" phenomenon to ensure equal opportunities for all colleagues.

Literacy is the Key: Investing in training is the only way to turn "Skeptics" into aware, productive users.

Full Study Under Submission: *"Adoption of Generative AI at the Italian Institute for Astrophysics: A Survey on Usage Trends, Ethics, Literacy, and Shadow IT"* (A. Cabras et al.)

THANKS!

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