

Title: The Good, the Bad and the AI: the New Frontier of Research Management.

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Summary

Generative AI (GenAI) has introduced a plethora of opportunities and, as more is known about how Large Language Models (LLMs) work, forced the world of research management to consider its utility and limitations. Positive benefits including content generation and enrichment, curation and classification, and generalised efficiency gains, need to be balanced against concerns for data integrity and quality, security and privacy and a potential over-reliance on automation.

Generative AI benefits in the context of research management software solution utility

For the purpose and context of this abstract, GenAI benefits are classed into content creation and enrichment, curation and classification, and process and efficiency gains. Each class of benefit serves to bolster the intended utility of most modern CRIS or RIMS (hereafter collectively referred to as RIMS) as laid out in the Code of Good Practice (CGP) (euroCRIS & CORDIS, 1998).

The utilities listed in the CGP include:

- Identify potential funding
- Evaluate research funding
- Avoid duplication of research activity
- Establish priorities for research activities
- Source for scientific publishing
- Inform educational establishments, industry and the general public
- Facilitate information access and exchange
- Facilitate exploitation of research
- Internal administrative functions
- Analyse research trends within and across countries
- Compare institutions within countries in R&D
- Promote international cooperation
- Contacts and networks
- Locate new market for products
- Locate new products for market
- Locate persons/organisations with desired skills
- Administration tool for research projects

Content curation and enrichment

In the context of content creation and enrichment, for each utility listed in the CGP, GenAI can enrich underlying data, whilst also connecting that enriched data to other content within a RIMS or the outside world. For example, to improve a researcher's chances of securing funding, a GenAI

model can be directed to enrich the researcher's corpus of research outputs with specifically inter/transdisciplinary keywords. These keywords can then be used to identify funding opportunities that may lay outside the researcher's primary field of research.¹

As a further example, GenAI could support international collaboration through identifying new contacts and networks. LLMs have demonstrated remarkable proficiency when comparing data inputs, which would allow them to compare research areas between institutions or even individual researchers to highlight possible overlapping research opportunities.

Further examples for each defined purpose of a RIMS are plentiful but the general pattern of enrichment and connection is what is important to note about GenAI opportunities in academic research management.

Curation and classification

GenAI can provide curation and classification benefits for a RIMS by using advanced natural language processing (NLP). NLP can parse and extract the content and context of each record providing additional explanatory metadata, descriptors and contexts. These additional data, when integrated into search and discoverability functionalities of the RIMS including public research portals, could serve both internal and external audiences; allowing interested stakeholders to find relevant research records and persons from subject-adjacent search terms, not explicitly mentioned on a record.

An example could include a corporate visitor to a research institution's public portal performing a search from the perspective of the corporate's needs and context. Prior processing by a GenAI agent specifically tuned to curate and classify content using corporate R&D terminologies and contexts would result in the visitor being shown search results linking academic and corporate research contexts, thereby improving chances of the successful exploitation of research outcomes and processes.

An additional example already demonstrated by Aalborg University (Vidmar, 2023), is the curation of data to improve data quality. A GenAI agent tuned to supplement and classify organisation data was successfully used to improve the analysis of collaboration between institutions.

The use of tuned GenAI agents as described in the above examples, provides customised and personalised curation and classification opportunities, further expanding CGP RIMs utilities.

Process and efficiency gains

Process and efficiency benefits from GenAI are more apparent given the examples listed in the previous two classes of benefits. The creation and enrichment, and curation and classification benefits can all be achieved by human experts but the obvious speed of a GenAI performing the same tasks cannot be understated. The resulting identification of patterns, trends and insights come at a significantly cheaper cost but, as will be highlighted in the following sections, come with significant caveats.

Potential negative effects of Generative AI on RIMs

For this abstract, negative effects of GenAI can be classed into data integrity and quality, security and privacy and a potential over-reliance on automation effects. Other negative effects including

¹ It is understood that interdisciplinary collaborative research does not necessarily result in higher funding success (e.g. (Bromham et al., 2016); rather the number of opportunities is increased.

hidden biases, ethical issues and in-equitability of GenAI resource intensity and accessibility, are also common and relevant, but outside the scope of this extended abstract.

Data Integrity and quality issues

GenAI is increasingly being used in the practice of research, with published research frequently containing egregious quality issues from the use of GenAI (e.g. images and cellular pathways included in Guo et al., 2024). However, for the purposes of this abstract, I will limit the negative effects of GenAI to post-capture processing in a RIMS.

Data integrity and quality, key factors in all *positive* benefits of GenAI, are not a given when using GenAI. Misinterpretations by LLMs can lead to poor or incorrect data being taken as fact. For example, the incorrect classification of content or addition of actually irrelevant keywords will, at the least, waste time and resources but could, at worst, ruin trust and taint potential opportunities.

Security and privacy risks

Most current commercial GenAI tools require content to be processed externally. There is a distinct lack of transparency in machine learning tools in general and specifically in services like ChatGPT (Franzoni, 2023; Fui-Hoon Nah et al., 2023). Additionally, commercial tools often explicitly state that content sent to their services will be used for further training of the LLMs used. By transferring potentially sensitive information as can be found in grant applications and researcher personal information, the utility of GenAI becomes fraught with danger; the dangers of other users gaining access to strategically sensitive information, or the dangers of personally identifiable information becoming public.

Services such as ChatGPT do have enterprise offerings, wherein no submissions to the service are used to train their public LLMs², but this does not negate the risk of other users within the *same* enterprise (or research institution) accessing that data as they would be accessing the same LLMs. A hypothetical example of a breach of security could include a researcher using LLM prompt injection³ to reveal details about other researchers' confidential award applications.

Over-reliance on automation

The value of human judgement and expertise in research management cannot be overstated. Even for less advanced data curation techniques, there is a strong desire in the RIMS administrator to have transparency and final authority over automation⁴.

In the parallel world of research evaluation (which almost always uses data from a RIMS, discussions over the dependence on metrics for evaluation of researchers are still relevant and known evaluation best practice frameworks and tools (e.g. DORA and Project TARA⁵) require the use of both quantitative and qualitative methods. An over-reliance on GenAI in research management may eventually reach the same point, wherein formal declarations (rather than the current "suggestions") in best practice frameworks may dictate that human expertise be the deciding factor.

² <https://openai.com/enterprise-privacy>

³ Examples of general LLM prompt injections: <https://developer.nvidia.com/blog/securing-llm-systems-against-prompt-injection/>

⁴ Pure customers were surveyed on data quality, and specifically asked about their level of comfort with completely automated data quality improvement processes. Only 7% of respondents wanted fully automated data quality processes. Survey sent October 2021; 84 respondents from 11 countries.

⁵ <https://sfdora.org/>

Strategic considerations for incorporation of GenAI into RIMS

To successfully navigate ‘the good, the bad and the ugly’ of GenAI in RIMS, it’s essential to consider a balanced approach. This could involve:

- Establishing data governance frameworks to ensure GenAI does not introduce data quality or integrity issues to a RIMS. This could, for example, include distinct guides for use by subject specialists and non-specialists (for data creation and enrichment) so that incorrect suggestions are not added to records. Another governance element could be to implement improved workflows around content management with clear indications around what additional (meta)data was automatically generated versus added by a human.
- Careful analysis of security and privacy considerations, such that sensitive data such as patent application drafts or confidential researcher data are not shared with commercial GenAI services nor included in training of local LLMs. This approach may be the most important to European RIMS customers who will struggle to align GDPR concerns with the utility of GenAI.
- Institute-level engagement with users and administrators of both RIMS and GenAI tools, to ensure the right level of human oversight is deployed, and careful communication of the risks of using GenAI.

Overall, GenAI provides RIMS-specific opportunities never imagined 10 years ago. The utility of a RIMS outlined in the CGP continues to be the primary reasons institutions continue to purchase these tools, and depending on the implementation and utilisation of GenAI, these tools can either supercharge, or sabotage, an institution’s research goals.

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