



European
Commission

Living guidelines on the **RESPONSIBLE USE OF GENERATIVE AI IN RESEARCH**

ERA Forum
Stakeholders'
document

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Research and
Innovation



Living guidelines on the responsible use of generative AI in research

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1. INTRODUCTION

Artificial intelligence (AI) has permeated our lives, transforming how we live and work. Over the past few years, a rapid and disruptive acceleration of progress in AI has occurred, driven by significant advances in widespread data availability, computing power and machine learning. Remarkable strides were made in particular in the development of foundation models - AI models trained on extensive volumes of unlabelled data¹. This innovation has given rise to what is known as 'General purpose AI', capable of performing a wide array of tasks, including the generation of various forms of new content (text, code, data, images, music, voice, videos, etc.), commonly referred to as 'generative AI', usually based on instructions (also known as prompts) provided by the user. The quality of the output produced by these models is such that it is difficult to distinguish it from human-generated content.

The widespread and rapid uptake of generative AI has triggered a lot of attention to and wide policy and institutional responses. The EU is taking the global lead with the AI Act, and other international governance efforts are taking place. These include the Hiroshima process² led by the G7 or the Bletchley Declaration³ signed after the AI Safety Summit.

Generative AI and research

Generative AI provides many opportunities for different sectors. However, it also harbours risks, such as the large-scale generation of disinformation and other unethical uses with significant societal consequences.

Research is one of the sectors that could be most significantly disrupted by generative AI. AI has great potential for accelerating scientific discovery and improving the effectiveness and pace of research and verification processes. Positive examples of the use of these tools by researchers include supporting non-native speakers in producing texts in multiple languages, producing text summaries from different sources across extremely large corpuses quickly, and automatically retrieving and contextualising a wide body of knowledge⁴. However, the technology also entails the risk of abuse. Some risks are due to the tool's technical limitations, and others have to do with the (intentional or unintentional) use of the tool in ways that erode sound research practices. Other risks for research in Europe could stem from the proprietary nature of some of the tools (for example, lack of openness, fees to access the service, use of input data) or the concentration of ownership.

The impact of generative AI on research and various aspects of the scientific process calls for reflection, for example, when working with text (summarising papers, brainstorming or exploring ideas, drafting or translating). In many respects, these tools could harm research integrity and raise questions about the ability of current models to combat deceptive scientific practices and misinformation.

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=COM:2024:28:FIN>

² <https://digital-strategy.ec.europa.eu/en/library/hiroshima-process-international-code-conduct-advanced-ai-systems>

³ <https://www.gov.uk/government/publications/ai-safety-summit-2023-the-bletchley-declaration/the-bletchley-declaration-by-countries-attending-the-ai-safety-summit-1-2-november-2023>

⁴ Results of a survey by Nature, <https://www.nature.com/articles/d41586-023-02980-0>

Why these guidelines

Different institutions, including universities, research organisations, funding bodies and publishers have issued guidance on how to use these tools appropriately to ensure that benefits of those tools are fully utilised. The proliferation of guidelines⁵ and recommendations has created a complex landscape that makes it difficult to decide which guidelines should be followed in a particular context.

For this reason, the European Research Area Forum⁶ (composed of European countries and research and innovation stakeholders⁷), decided to develop guidelines on the use of generative AI in research for: funding bodies, research organisations and researchers, both in the public and private research ecosystems.

These guidelines focus on one particular area of AI used in the research process, namely generative Artificial Intelligence. There is an important step to prevent misuse and ensure that generative AI plays a positive role in improving research practices. One of the goals of these guidelines is that the scientific community uses this technology in a responsible manner. Yet, the development of a robust framework for generative AI in scientific research cannot be the sole responsibility of policymakers (at European and national levels). Universities, research organisations, funding bodies, research libraries, learned societies, publishers and researchers at all stages of their careers are essential in shaping the discussion on AI and how it can serve the public interest in research. They should all actively engage in discussions about the responsible and effective deployment of AI applications, promoting awareness and cultivating a responsible use of AI as part of a research culture based on shared values. Rules and recommendations must go hand in hand with a broad engagement of those involved in public and private research, both organisations and individuals, to develop a culture of using generative AI in research appropriately and effectively.

These guidelines intend to set out common directions on the responsible use of generative AI. They have to be considered as a supporting tool for research funding bodies, research organisations and researchers, including the ones applying to the European Framework Programme for Research and Innovation. They are not binding. They take into account key principles on research integrity as well as already existing frameworks for the use of AI in general and in research specifically. Users of these guidelines are encouraged to adapt them to their specific contexts and situations, keeping proportionality in mind.

These guidelines complement and build on the EU AI policy, including the Artificial Intelligence Act⁸. They complement other policy activities on the impact of AI in science. These include the opinion of the Scientific Advice Mechanism⁹ (SAM) on AI and a policy brief published by the European Commission's Directorate-General for Research and Innovation, framing challenges and opportunities.

⁵ Different guidelines that have been identified are listed in the References section of this document.

⁶ <https://european-research-area.ec.europa.eu/era-forum>

⁷ https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/commission-launches-new-era-forum-transition-2021-02-08_en

⁸ <https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>

⁹ <https://scientificadvice.eu/advice/artificial-intelligence-in-science>

Key principles

The set of principles framing these guidelines are based on pre-existing relevant frameworks:

- the European Code of Conduct for Research Integrity¹⁰.
- the work and guidelines on trustworthy AI, developed by the High-Level Expert Group on AI¹¹.

Building on the commonalities of the currently emerging guidelines from various stakeholders, the key principles behind these guidelines for the responsible use of generative AI in research are:

- **Reliability** in ensuring the quality of research, reflected in the design, methodology, analysis and use of resources. This includes aspects related to verifying and reproducing the information produced by the AI for research. It also involves being aware of possible equality and non-discrimination issues in relation to bias and inaccuracies.
- **Honesty** in developing, carrying out, reviewing, reporting and communicating on research transparently, fairly, thoroughly and impartially. This principle includes disclosing that generative AI has been used.
- **Respect** for colleagues, research participants, research subjects, society, ecosystems, cultural heritage and the environment. Responsible use of generative AI should take into account the limitations of the technology, its environmental impact and its societal effects (bias, diversity, non-discrimination, fairness and prevention of harm). This includes the proper management of information, respect for privacy, confidentiality and intellectual property rights, and proper citation.
- **Accountability** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider societal impacts. This includes responsibility for all output a researcher produces, underpinned by the notion of human agency and oversight.

Next steps

Generative AI may create possibilities and risks that can be hardly anticipated and fully comprehended today. These guidelines are based on the current state of the technology and the surrounding policy landscape. Given the dynamic nature of both, these guidelines will have to adapt and evolve continuously. They will be updated on a regular basis to ensure that they remain a useful resource for researchers and organisations. These guidelines were developed and will continue to be developed collaboratively as part of the ERA Forum activities. Users of these guidelines may provide feedback and suggestions for adaptations in the feedback form¹².

¹⁰ <http://www.doi.org/10.26356/ECOC>

¹¹ <https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai>

¹² Feedback from for the guidelines: https://ec.europa.eu/eusurvey/runner/feedback_GenAIResearch

2. GUIDELINES ON THE RESPONSIBLE USE OF GENERATIVE AI IN RESEARCH

2.1. RECOMMENDATIONS FOR RESEARCHERS

For generative AI to be used in a responsible manner, researchers should:

- 1. Remain ultimately responsible for scientific output.**
 - Researchers are accountable for the integrity of the content¹³ generated by or with the support of AI tools.
 - Researchers maintain a critical approach to using the output produced by generative AI and are aware of the tools' limitations, such as bias, hallucinations¹⁴ and inaccuracies.
 - AI systems are neither authors nor co-authors. Authorship implies agency and responsibility, so it lies with human researchers.
 - Researchers do not use fabricated material created by generative AI in the scientific process, for example falsifying, altering or manipulating original research data.
- 2. Use generative AI transparently.**
 - Researchers, to be transparent, detail which generative AI tools have been used substantially¹⁵ in their research processes. Reference to the tool could include the name, version, date, etc. and how it was used and affected the research process. If relevant, researchers make the input (prompts) and output available, in line with open science principles.
 - Researchers take into account the stochastic (random) nature of generative AI tools, which is the tendency to produce different output from the same input. Researchers aim for reproducibility and robustness in their results and conclusions. They disclose or discuss the limitations of generative AI tools used, including possible biases in the generated content, as well as possible mitigation measures.
- 3. Pay particular attention to issues related to privacy, confidentiality and intellectual property rights when sharing sensitive or protected information with AI tools.**
 - Researchers remain mindful that generated or uploaded input (text, data, prompts, images, etc.) could be used for other purposes, such as the training of AI models. Therefore, they protect unpublished or sensitive work (such as their own or others' unpublished work) by taking care not to upload it into an online AI system unless there are assurances that the data will not be re-used, e.g., to train future language models or to the untraceable and unverifiable reuse of data.

¹³ Content should not be fabricated, falsified or plagiarised. More details in Section 3.1 of *The European Code of Conduct for Research Integrity*, <http://www.doi.org/10.26356/ECOC>, ALLEA 2023.

¹⁴ "hallucination" refers to the generation of false, nonsensical, or inaccurate information by large language models (LLMs) or other generative AI systems.

¹⁵ For example, using generative AI as a basic author support tool is not a substantial use. However, interpreting data analysis, carrying out a literature review, identifying research gaps, formulating research aims, developing hypotheses, etc. could have a substantial impact.

- Researchers take care not to provide third parties' personal data to online generative AI systems unless the data subject (individual) has given them their consent and researchers have a clear goal for which the personal data are to be used so compliance with EU data protection rules¹⁶ is ensured¹⁷.
 - Researchers understand the technical and ethical implications regarding privacy, confidentiality and intellectual property rights. They check, for example, the privacy options of the tools, who is managing the tool (public or private institutions, companies, etc.), where the tool is running and implications for any information uploaded. This could range from closed environments, hosting on a third-party infrastructure with guaranteed privacy, to open internet-accessible platforms.
- 4. When using generative AI, respect applicable national, EU and international legislation, as in their regular research activities.** In particular, the output produced by generative AI can be especially sensitive in relation to the protection of intellectual property rights and personal data.
- Researchers pay attention to the potential for plagiarism (text, code, images, etc.) when using outputs from generative AI. Researchers respect others' authorship and cite their work where appropriate. The output of a generative AI (such a large language model) may be based on someone else's results and require proper recognition and citation¹⁸.
 - The output produced by generative AI can contain personal data. If this becomes apparent, researchers are responsible for handling any personal data output responsibly and appropriately, and EU data protection rules are to be followed.
- 5. Continuously learn how to use generative AI tools properly to maximise their benefits, including by undertaking training.**
- Generative AI tools are evolving quickly, and new ways to use them are regularly discovered. Researchers stay up to date on the best practices and share them with colleagues and other stakeholders.
- 6. Refrain from using generative AI tools substantially¹⁹ in sensitive activities that could impact other researchers or organisations (for example peer review, evaluation of research proposals, etc).**
- Avoiding the use of generative AI tools eliminates the potential risks of unfair treatment or assessment that may arise from these tools' limitations (such as hallucinations and bias).
 - Moreover, this will safeguard the original unpublished work of fellow researchers from potential exposure or inclusion in an AI model (under the conditions detailed above in the recommendation for researchers #3).

¹⁶ https://commission.europa.eu/law/law-topic/data-protection/eu-data-protection-rules_en

¹⁷ Apart from personal consent there could be other lawful basis that could justify the processing of personal data.

¹⁸ The technology is evolving, and generative AI tools will be more capable of providing correct citations. Tools providing citations could be more practical and could be favoured, but the final responsibility on the citation and its correctness remains with the researcher.

¹⁹ For example, using generative AI to search background info for a review is not a substantial use, while delegating the evaluation or the assessment of a paper is a substantial use.

2.2. RECOMMENDATIONS FOR RESEARCH ORGANISATIONS

For generative AI to be used in a responsible manner, research organisations should:

1. **Promote, guide and support the responsible use of generative AI in research activities.**
 - Research organisations provide and/or facilitate training on using generative AI, especially (but not exclusively) on verifying output, maintaining privacy, addressing biases and protecting intellectual property rights.
 - Research organisations provide support and guidelines to ensure compliance with ethical and legal requirements (EU data protection rules, protection of intellectual property rights, etc.).
2. **Actively monitor the development and use of generative AI systems within their organisations.**
 - Research organisations remain mindful of the research activities and processes for which they use generative AI to better support its future use. This knowledge can:
 - be used to provide further guidance on using generative AI, help identify training needs and understand what kind of support could be most beneficial;
 - help anticipate and guard against possible misuse and abuse of AI tools;
 - be published and shared with the scientific community.
 - Research organisations analyse the limitations of the technology and tools and provide feedback and recommendations to their researchers.
3. **Reference or integrate these generative AI guidelines into their general research guidelines for good research practices and ethics.**
 - Using these guidelines as a basis for discussion, research organisations openly consult their research staff and stakeholders on the use of generative AI and related policies.
 - Research organisations apply these guidelines whenever possible. If needed, they could be complemented with specific additional recommendations and/or exceptions that should be published for transparency.
4. **Whenever possible and necessary, implement locally hosted or cloud-based generative AI tools that they govern themselves²⁰. This enables their employees to feed their scientific data into a tool that ensures data protection and confidentiality.**
 - Organisations ensure the appropriate level of cybersecurity of these systems, especially those connected to the internet.

²⁰ Or governed by trustworthy third parties e.g. partner research organizations, the EU or trusted countries.

2.3. RECOMMENDATIONS FOR RESEARCH FUNDING ORGANISATIONS

Research funding organisations operate in different contexts and follow different mandates and regulations, which may not align with a single set of guidelines. The recommendations below outline a set of measures and good practices for organisations to implement in ways that best fit their specific circumstances and objectives.

For generative AI to be used in a responsible manner, research funding organisations should:

- 1. Promote and support the responsible use of generative AI in research.**
 - Research funding organisations design funding instruments that are open, receptive and supportive of the responsible and ethical use of generative AI technologies in research activities.
 - Research funding organizations require funded research and grantees to be in line with existing national, EU and international legislation (where applicable) and good practices for the use of generative AI.
 - Research funding organisations encourage researchers and research organisations to use generative AI ethically and responsibly, including respecting legal and research standards requirements.
- 2. Review the use of generative AI in their internal processes. They will lead the way by ensuring they use it transparently and responsibly.**
 - Research funding organisations remain fully responsible for the use of generative AI in their activities, in line with the accountability principle that emphasises responsibility and human oversight.
 - Research funding organisations use generative AI transparently, in particular for activities related with the management of assessment and evaluation purposes, and without compromising the confidentiality of the content and the fairness of the process²¹.
 - When choosing generative AI tools, research funding organisations will carefully consider the tool's adherence to standards of quality, transparency, integrity, data protection, confidentiality and respect for intellectual property rights.
- 3. Request transparency from applicants on their use of generative AI facilitating ways to report it.**
 - Applicants declare if they used substantially²² generative AI tool(s) to prepare their application.
 - Applicants provide information on the role of generative AI in the research activities proposed and carried out.
- 4. Monitor and get actively involved in the fast-evolving generative AI landscape.**
 - Research funding organisations promote and fund training and educational programmes for an ethical and responsible use of AI in scientific research.

²¹ In activities related with the assessment and evaluation of the scientific content in itself, generative AI should be avoided as described in the recommendation for researchers number 6.

²² As mentioned in the recommendations for researchers, using generative AI as a basic author support tool is not a substantial use. However, interpreting data analysis, carrying out a literature review, identifying research gaps, formulating research aims, developing hypotheses, etc. could have a substantial impact.

BACKGROUND

RESEARCH INTEGRITY

The [European Code of Conduct for Research Integrity](#) by All European Academies (ALLEA) lays down a set of principles to produce sound research, including ethical aspects. These principles include:

- **reliability** in ensuring the quality of research, reflected in the design, methodology, analysis and use of resources;
- **honesty** in developing, carrying out, reviewing, reporting and communicating on research transparently, fairly, thoroughly and impartially;
- **respect** for colleagues, research participants, research subjects, society, ecosystems, cultural heritage and the environment;
- **accountability** for the research from idea to publication, for its management and organisation, for training, supervision, and mentoring, and for its wider societal impacts.

TRUSTWORTHY AI

The [Ethics Guidelines for Trustworthy AI](#) by the EU [High-Level Expert Group on AI](#) focuses on developing responsible AI systems (rather than using them). This work on trustworthy AI contains a set of ethical principles that were translated into operational requirements for developing AI systems. The requirements could be useful inspiration for drawing up guidelines on the use of generative AI.

The four ethical principles for AI systems are:

1. respect for human autonomy;
2. prevention of harm;
3. fairness;
4. explicability.

These ethical principles were used to develop these seven operational key requirements:

1. human agency and oversight²³;
2. technical robustness and safety;
3. privacy and data governance;
4. transparency;
5. diversity, non-discrimination and fairness;
6. environmental and societal well-being;
7. accountability.

²³ Human agency and oversight includes human-in-the-loop (HITL), human-on-the-loop (HOTL) and human-in-command (HIC) approaches. HITL involves human intervention in every decision cycle of the system, which in many cases is neither possible nor desirable. HOTL involves human intervention during the design cycle of the system and monitoring how the system operates. HIC involves overseeing the overall activity of the AI system (including its broader economic, societal, legal and ethical impact) and the ability to decide when and how to use the system in any particular situation (Ethics Guidelines for Trustworthy AI).

OTHER FRAMEWORKS OF PRINCIPLES

[KU Leuven principles](#) were used in similar exercises and for the development of these guidelines:

- **transparency** on the use of generative AI, depending on the type of use;
- **verification** of the correctness of the generated output with attention to correctly attributing the source;
- **respect** for personal data and confidential information by not entering these on platforms that are not managed on proprietary servers;
- **responsibility** for the correct use of generative AI (primarily help and support) and the published output.

Specialists in AI, generative AI, computer science, psychology and sociology hosted by the Institute for Advanced Study at the University of Amsterdam identified the principles of accountability, transparency and independent oversight (in relation to developers of generative AI). Based on these principles, they proposed living guidelines for the responsible use of generative AI²⁴.

These principles could be complemented with those from other sources. These include [the principles put forward by the Association for Computer Machinery on generative AI Technologies](#) that have a broad scope for those developing, deploying and using the technology. Other sources are the [Values Framework for the Organisation of Research](#) developed by Science Europe or the [STM²⁵ principles for ethical and trustworthy AI](#).

SYNTHESIS FOR THE DEVELOPMENT OF EU GUIDELINES

The ALLEA principles in the European [Code of Conduct for Research Integrity](#) serve as guidance for ethical and responsible research. The same value system applies when using generative AI in research. The ALLEA principles can therefore be used as a basis for these guidelines and be enriched with parts from the other frameworks described in the previous sections. The principles for the guidelines on the responsible use of generative AI in research are as set out below.

- **Reliability** in ensuring the quality of research, reflected in the design, methodology, analysis and use of resources. This includes aspects related to verifying and reproducing the information produced by the AI for research. It also involves being aware of possible equality and non-discrimination issues in relation to bias and inaccuracies.
- **Honesty** in developing, carrying out, reviewing, reporting and communicating on research transparently, fairly, thoroughly and impartially. This principle includes disclosing that generative AI has been used.
- **Respect** for colleagues, research participants, research subjects, society, ecosystems, cultural heritage and the environment. Responsible use of generative AI should take into account the limitations of the technology, its environmental impact and its societal effects (bias, diversity, non-discrimination, fairness and prevention of harm). This includes the proper management of information, respect for privacy, confidentiality and intellectual property rights, and proper citation.

²⁴ <https://www.nature.com/articles/d41586-023-03266-1>

²⁵ The International Association of Scientific, Technical and Medical Publishers

- **Accountability** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider societal impacts. This includes responsibility for all output a researcher produces, underpinned by the notion of human agency and oversight.

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GUIDELINES ANALYSED

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<https://www.aalto.fi/en/services/responsible-use-of-artificial-intelligence-in-the-research-process>

All European Academies (ALLEA): <http://www.doi.org/10.26356/ECOC>

Arizona State University:

<https://researchintegrity.asu.edu/export-controls-and-security/artificial-intelligence>

Association for Computing Machinery (ACM):

<https://www.acm.org/binaries/content/assets/public-policy/ustpc-approved-generative-ai-principles>

Australian Government Tertiary Education Quality and Standards Agency (TEQSA):

<https://www.teqsa.gov.au/guides-resources/higher-education-good-practice-hub/artificial-intelligence>

Bockting CL, van Dis EAM, van Rooij R, Zuidema W, Bollen J. Living guidelines for generative AI - why scientists must oversee its use. Nature. 2023 Oct;622(7984):693-696.

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<https://publicationethics.org/cope-position-statements/ai-author>

Deakin University: <https://deakin.libguides.com/generative-AI/ethics-evaluation>

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International Association of Scientific, Technical and Medical Publishers (STM):

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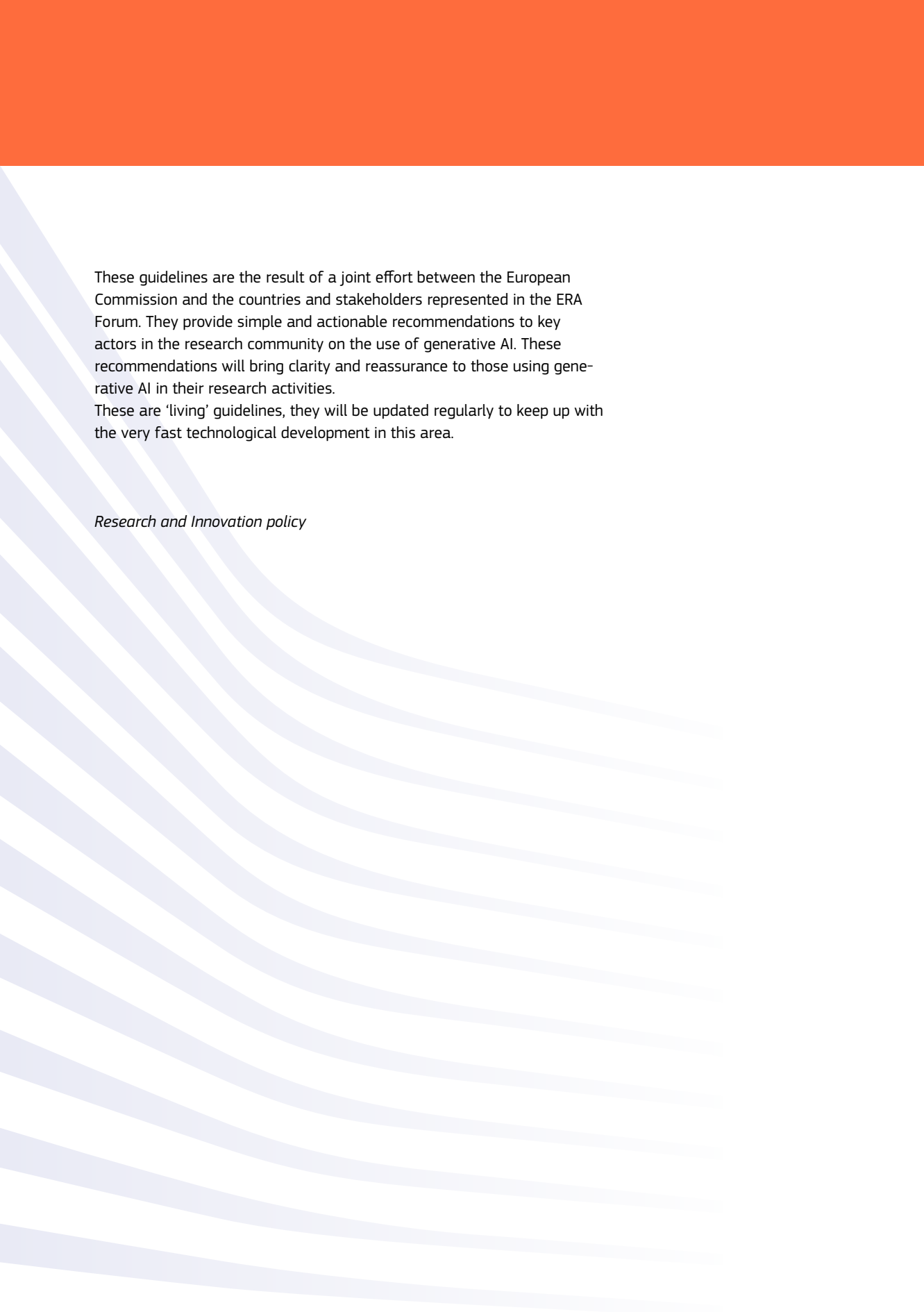
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These guidelines are the result of a joint effort between the European Commission and the countries and stakeholders represented in the ERA Forum. They provide simple and actionable recommendations to key actors in the research community on the use of generative AI. These recommendations will bring clarity and reassurance to those using generative AI in their research activities.

These are 'living' guidelines, they will be updated regularly to keep up with the very fast technological development in this area.

Research and Innovation policy