

NATIONAL INSTITUTE OF RESEARCH AND DEVELOPMENT  
FOR INDUSTRIAL ECOLOGY

**ECOIND**

EXCELLENCE IN RESEARCH AND ENVIRONMENTAL SERVICES

## **CO-AUTHORSHIP GUIDE**

The document contains the National Research and Development Institute for Industrial Ecology  
– ECOIND guide on co-authorship



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## Introduction

As there are significant differences in publication practice between disciplines, there are no universally accepted standards for assigning authorship. Unfortunately, concerns and disputes about who should be the authors of a publication may arise quite often, which has resulted in the widely accepted and general Vancouver recommendations<sup>1</sup>.

Co-authorship and the authors order should be not determined by ambiguous rules. ECOIND recommends that the Vancouver recommendations to be applied in the context of co-authorship in publications. Vancouver recommendations are defining the role of authors, contributors and non-author contributor.

## Criteria for co-authorship

Being a co-author says little about the size of the contribution of the co-author in question. Therefore, several journals have started collecting information about the contributions of the respective co-authors of the paper to be published. If you are planning to publish in a journal, you will be asked to give information about the contributions of the respective co-authors during the submission process, and this information will most likely be published alongside with the paper.

There are very few traditional rules regarding co-authorship. The closest we get are the Vancouver recommendations, which describe the role and the responsibilities of a co-author. Even though the Vancouver recommendations is not a law, ECOIND urges its employees to follow them. According to the Vancouver recommendations, the following criteria must be fulfilled for someone to qualify as a co-author of a paper:

- Contributed substantially to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; and
- Drafted the work or revised it critically for important intellectual content; and
- Made a final approval of the version to be published; and
- Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

The following contributions are explicitly excluded as qualifying for authorship: research funding, general supervision of a research group, general administrative support, assistance with writing, technical editing, language editing and proofreading.

All co-authors must agree to be accountable for all aspects of the published work and for ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. A co-author must also be sufficiently familiar with the work underlying a publication to be able to identify the contributions of the other co-authors. In some cases, a contributor may meet one, two or three of the above criteria, but not all four. In such cases, the Vancouver Recommendations state that the person in question shall be acknowledged for their contribution to the article, for example in the 'acknowledgements', but not included in the list of authors. If possible, each of the co-authors'

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<sup>1</sup> <https://www.icmje.org/icmje-recommendations.pdf>

contributions and the names to be included in the list of authors should be agreed in advance, since this will help prevent conflicts during the work or the publication process.

Moreover, practices related to co-authorship vary between disciplines. There are few applicable laws and rules in this area, and the way in which the co-authors are listed can vary from one discipline to another. As a main rule, the person who has made the greatest contribution to the article should be listed as first author. In some disciplines, it is also common for the co-author who has made the second greatest contribution to be listed as the last author.

The Vancouver Recommendations give no instructions regarding who is entitled to be the last author or corresponding author. Therefore, the group of authors needs to agree on this among themselves. When publishing an article written by multiple co-authors, one of them shall appear as corresponding author. The corresponding author is the contact person for the journal and helps ensure that the peer reviewers receive answers to questions that arise during the review process.

The reason why scientific authorship is important in research is that authorship fulfils the following important functions:

- **Crediting:** Authorship reflects a scientific (intellectual) contribution and functions as a credential.
- **Recognition:** Authorship recognises and provides the listed individuals with professional acknowledgement.
- **Accountability:** Authorship assigns responsibility to those named as authors.
- **Evaluation:** Authorship is used to evaluate researchers, including in applications for posts and funding decisions.
- **Collaboration:** Co-authorship indicates collaboration and participation in research networks, which play a key role in evaluation and recognition of research and research groups.

## Unethical authorship practices

- **Gift authorship:** As the name suggests, authorship is given as a “gift,” often with the aim of some form of reciprocity.
- **Honorary authorship:** Authorship granted (without a qualifying contribution), as a gesture of respect or to honour someone. Honorary authorship is often viewed as a form of gift authorship.
- **Guest authorship:** Involves adding (often prominent) individuals to the author list to lend credibility or prestige to the “host” or publication. Related to honorary authorship.
- **Ghost authorship:** A person writes the entire text or makes substantial contributions but is not credited as a (co-)author.
- **Excluded authorship:** An individual who has made a substantial contribution is excluded from the list of (co-)authors. Also commonly referred to as “orphan authorship”.

- **Mandatory (forced) authorship:** An individual, such as a research leader, claims the right to be listed as a co-author in all publications issued by their project or institution. Members of the research team feel obliged to include the person in question as a co-author.
- **Falsified (forged) authorship:** An individual is listed as a co-author without their knowledge or the wrong person is included in the list of authors. Also known as “forged authorship”.
- **Duplicate publications:** Publishing the same or similar content with modified author lists to artificially inflate recognition.
- **Fictitious (fake) authorship:** Fictitious individuals are listed as co-authors.

## Needed contribution

The Vancouver Recommendations and similar publication ethics guidelines go into a some detail about how much someone should contribute to qualify as a co-author: The contributions must be substantial. Minor involvement in design or data collection is therefore not sufficient. Additionally, co-authors must have either drafted a version of the manuscript or provided substantial intellectual contributions during revisions of the study. General feedback or language suggestions alone therefore do not meet the criteria. Researchers must have made substantial intellectual contributions

## Order of authorship

Different scientific disciplines have different ways of determining the order of authorship – and these conventions evolve over time. In medicine, health sciences and life sciences, the first author is typically the individual who made the greatest contribution to the study, while the last author is often a senior researcher (such as a supervisor, who takes overall responsibility for the study). The roles of middle authors depend on the norms of the specific field.

## Decision of co-authorship

The person who contributes the most to the research should determine the list of authors (unless it is arranged alphabetically). Anyone (who meets the first criterion of the Vancouver Recommendations) may qualify as a co-author and should be given the chance to contribute enough to earn co-authorship. Those who do not qualify as co-authors, but who still have contributed, should be named and thanked in the acknowledgements section.

Unfortunately, the person who makes the greatest contributions does not always determine the author list in practice. Research leaders, project leaders and supervisors often take control of this process, sometimes inviting individuals who do not meet the qualifications to be listed as co-authors. This practice is problematic due to asymmetric power dynamics, and also undermines the credibility of the authorship institution.

## Accountability

Vancouver Recommendations stipulate that all co-authors are accountable when they become co-authors and must assume responsibility for any errors that may be present in the publication. However, in complex research projects with multiple specialised contributions, it can obviously be difficult for co-authors to fully understand or be accountable for each individual aspect of the research. To address this, co-authors are typically held accountable for the parts of the research they directly contributed to. Additionally, they must be able to identify which co-authors are responsible for other parts of the work and trust the integrity of those contributions.

## Artificial authorship

Artificial intelligence (AI), machine learning (ML) and large language models (LLMs) have introduced ground-breaking methods for generating meaningful text, challenging traditional concepts of authorship. These models rely on massive datasets, often containing text created by others. This gives rise to the following issues with regard to the traditional roles of authorship (see also above):

- **Crediting:** Authorship may become an unreliable way to credit intellectual contributions (such as originality).
- **Recognition:** Being listed as an author may no longer provide a basis for professional acknowledgement.
- **Accountability:** As a listed author, persons may be held accountable for content they did not write or fully understand.
- **Evaluation:** Authorship may lose its significance as a metric for evaluating researchers' work.
- **Collaboration:** Authorship may lose its role as an indicator of networks or collaboration.

In summary, AI and ML could diminish the value of authorship, potentially driving a need for new ways to credit, recognise and evaluate research contributions. The use of AI/ML-generated text naturally also poses other ethical challenges in research, including concerns about plagiarism and intellectual property rights.

## Ethical norms for co-authorship

- **Honesty:** Researchers must be honest about their own and others' contributions.
- **Transparency:** Researchers must be transparent about the origin and progression of the scientific research. This means that anyone eligible to be a co-author should have the chance to contribute sufficiently to meet the criteria. They must also disclose any potential conflicts of interest that might influence authorship decisions.
- **Credibility:** Researchers must be veracious (report truthfully) about the contributions of all individuals involved in the research.

- **Accountability:** Researchers must take responsibility for the parts of the work they contributed to and be prepared to give an account of the contributions of others and the overall integrity of the research.
- **Collegiality:** Researchers must treat colleagues with respect and uphold their integrity. It is also important to contribute to a collegiate culture that supports these ethical norms.
- **Acknowledgement:** Researchers must acknowledge the contributions of others to a scientific study.
- **Integrity:** Researchers must demonstrate the ability to act in accordance with the norms for (co-)authorship and publication ethics. This includes avoiding practices such as guest authorship, gift authorship, honorary authorship, ghost authorship or any other inappropriate (co-)authorship practices, as outlined above.

Beyond these internal norms, it is crucial to acknowledge the imbalance of power and status, which can make it difficult for junior researchers to raise concerns about authorship. Experienced researchers must take responsibility that extends beyond just their own contributions to the work.

## Interdisciplinary and international collaborations co-authorship

Collaboration partners from different countries and academic traditions may have differing norms for or interpretations of co-authorship practices. Communication differences can also create problems, while contrasting leadership styles in research can further complicate the process. Additionally, differing conventions for recognition and evaluation may create conflicting expectations for publication. Countries may also have divergent rules for intellectual property rights, research integrity and collegiality that could be reflected in co-authorship norms.

These (and other) authorship issues can be prevented in interdisciplinary and international research collaborations by:

- Drawing up explicit agreements at an early stage,
- Holding regular meetings (where agreements are updated),
- Embedding clear and explicit research leadership, transparently and inclusively addressing authorship as a topic,
- Providing training in each other's authorship norms and ethical standards, norms and principles for handling authorship disputes and offering some practical advice.

As long as authorship has a value and plays so many important roles in research, conflicts and controversies will continue to arise. However, these issues can be mitigated and effectively managed by applying established authorship norms rooted in publication ethics.

## Tool to help determining co-authorship

<i>Activities</i>	<i>Person name</i>				
	<i>Possible research roles</i>				
	<i>Individual researcher</i>	<i>Supervisor</i>	<i>Project responsible</i>	<i>Laboratory / Department Head</i>	<i>Other (specify)</i>
Person participated in the conception and design of research output					
Person participated in drafting or writing significant parts or critically reviewed it so as to contribute to interpretation					
Person participated in data acquisition where has required significant intellectual judgement, planning, design or input					
Person participated in the interpretation or analysis of data on which the research output is based					
<i>Included as co-author?</i>	<i>YES if two or more cells are ticked NO if less than two cells are ticked</i>				

Ticking the boxes will help determine who should appear / not appear as co-author. Depending on the number of roles/ticks entitlement to co-authorship can be decided. Attribution of authorship depends to some extent on the discipline / field but in all cases must be based on a substantial contribution to at least two of the above activities.