



Practices, drivers and impediments in the use of preprints

Phase 1 report (March 2019)

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Practices, drivers and impediments in the use of preprints

INTRODUCTION

Background and rationale

- The traditional academic publishing process is known to be time-consuming and, in some cases, slow.
- Preprints have started becoming more widespread in a number of disciplines over the past few years to partly address this and allow authors to share their work ahead of formal publication. Publishers, among other stakeholders, have picked up on this emerging trend.
- This study aims to advance KE's existing work in the area of preprints, which consists of a review on this evolving landscape run in 2018.

The evolving preprint landscape
Introductory report for the Knowledge Exchange working group on preprints
DOI: 10.17605/OSF.IO/796TU

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 21 May 2018

The evolving preprint landscape: Introductory report for the Knowledge Exchange working group on preprints

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Objectives of the study

- The overall objective is to explore the place of preprints in the research lifecycle from the points of view of **researchers, research performing organisations, research funding organisations and preprint servers/service providers.**
- Particularly, we aimed to investigate:



Core benefits for
researchers



Attitudes of institutions
and funders



Usage by
researchers



Incentives and
disincentives for
researchers



Values, strategies
and aims of service
providers

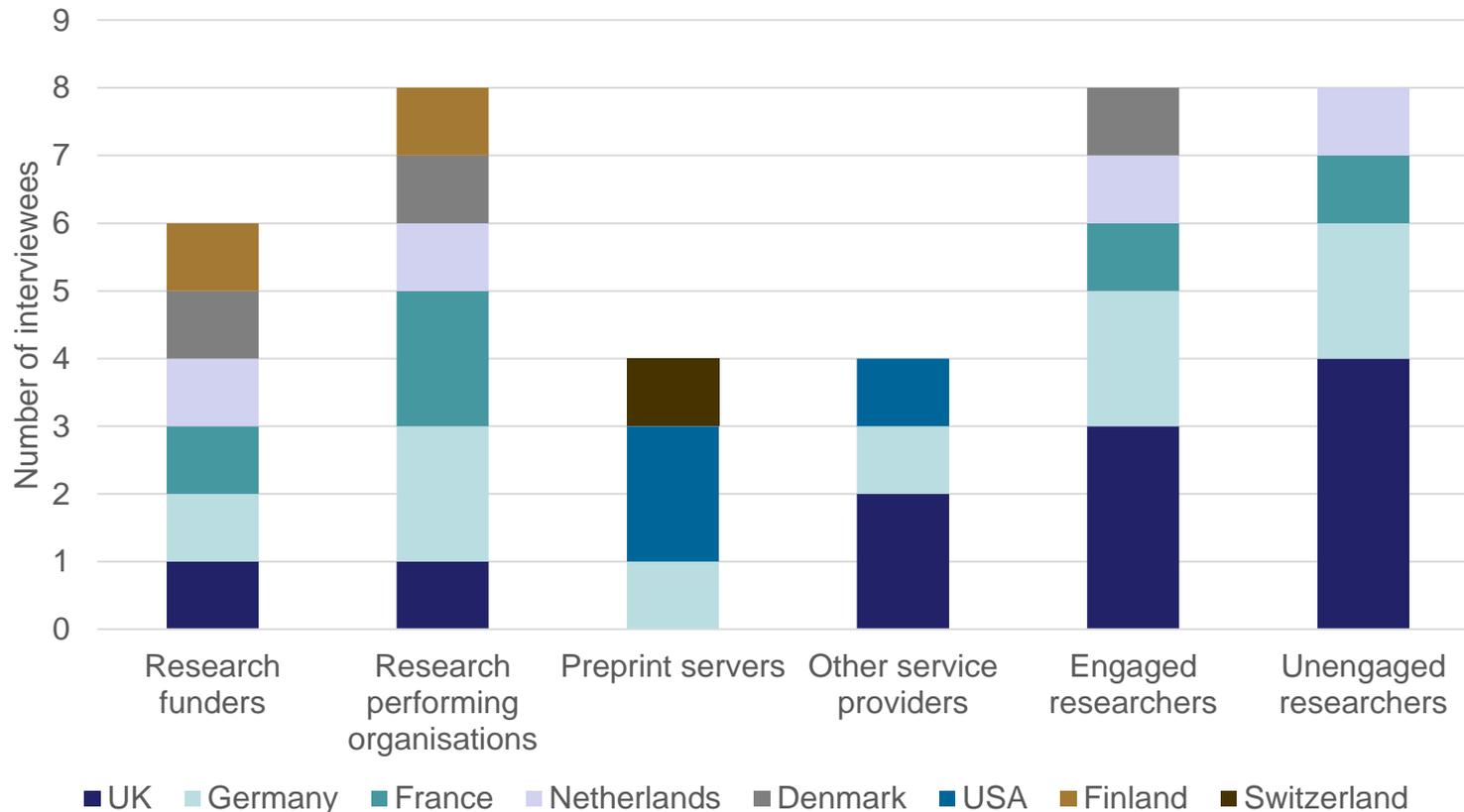
Outline methodology

-  Literature review (60+ sources)
-  38 interviews and transcription
-  Qualitative coding
-  Analysis and reporting

Detailed methodology

- This study focused on disciplines where the use of preprints is increasing quickly. These included biology, chemistry and psychology, with the corresponding preprint servers bioRxiv, ChemRxiv and PsyArXiv.
- Interview questions have been developed using the Innovation Diffusion Theory as the framework of analysis and then narrowed down in collaboration with KE's Task and Finish Group.
- Interviews have been conducted, recorded and transcribed using [GoToMeeting](#). Consent to the terms of this study has been obtained by Research Consulting from all participants. Where GoToMeeting transcriptions were not appropriate (e.g. accent not recognised) [Happy Scribe](#) was used.
- The transcribed interviews were coded using [NVivo](#). The coding structure, i.e. the way we analysed themes (see slide 8), has been developed in collaboration with Prof Stephen Pinfield (University of Sheffield).
- All anonymised quotes in this slide deck arose from our stakeholder interviews.
- The limitations of this study are listed in Appendix A.

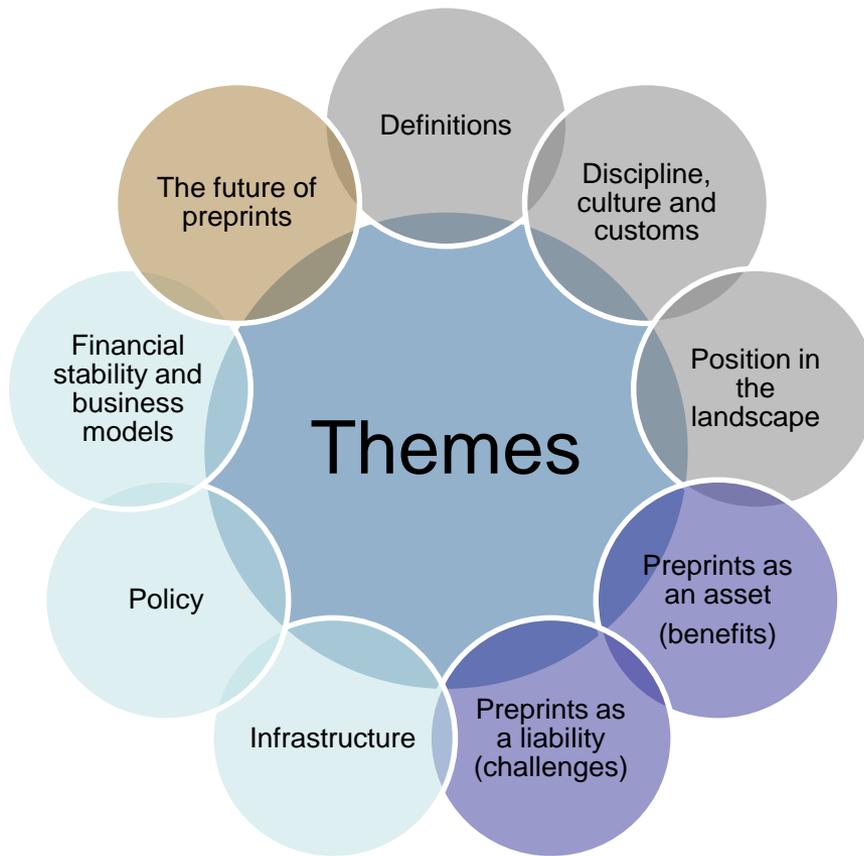
A wide range of international stakeholders contributed to this study



Practices, drivers and impediments in the use of preprints

OVERVIEW

Themes emerged from qualitative coding and report structure



Report structure

What is a preprint?

Potential benefits and challenges

Infrastructure and funding

The future of preprints

Summary

MACRO



Research funding organisations

- Uncertainty of the practical value of preprints for open scholarship practices
- Discoverability and findability of research
- Recognition that preprints may form part of HR processes

MESO



Research performing organisations

- Time and resources required
- Importance of preprints to research funders
- Institutional and subject repositories ('Green OA')
- Use of preprints when evaluating researcher performance for hiring and promotion purposes



Preprint servers

- Business models
- Uptake of the features of preprint servers such as commenting
- Process for the retraction of preprints
- Software and infrastructure to track preprints throughout the publication process

MICRO



Researchers

- Guidance on whether preprints are acceptable to journals
- Appropriateness of preprints in CVs for career progression purposes
- Use and availability of DOIs/permalinks
- Guidance on preprint citation practices

What is the evidence that sharing preprints is beneficial in practice?

Who should cover the costs of preprint servers and long-term preservation?

Is it appropriate to share preprints where the topic is sensitive?

Practices, drivers and impediments in the use of preprints

WHAT IS A PREPRINT?

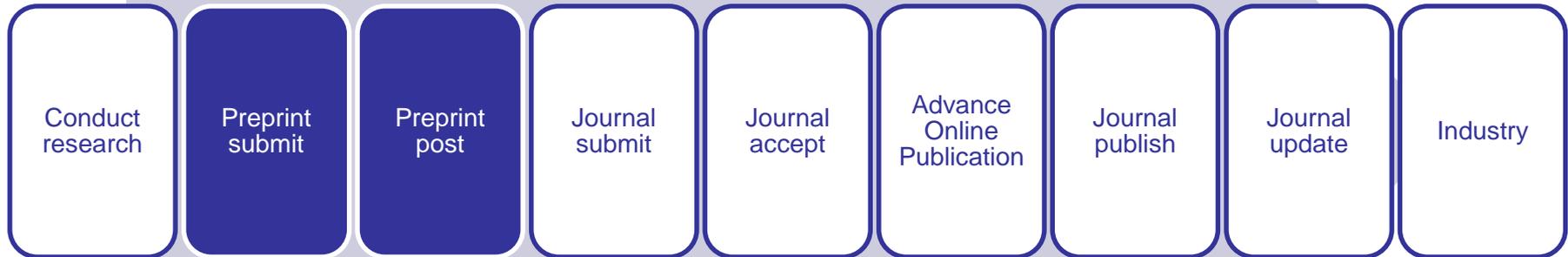
Discipline, culture and customs

“The first preprint I wrote was 50 years ago. When I wrote my first paper, it was typed out carbon copies and sent to people who might be interested.”

Researcher (chemistry)

What is a preprint?

- The study started with the following working definition of a “preprint”:
A version of a research paper prior to peer review and publication in a journal.



Preprint practices are at different stages of development based on the discipline



- Established preprints culture
 - arXiv (since 1991): mostly, physics and mathematics, but other disciplines are in-scope
 - WoPEC, then RePEc (1993): economics



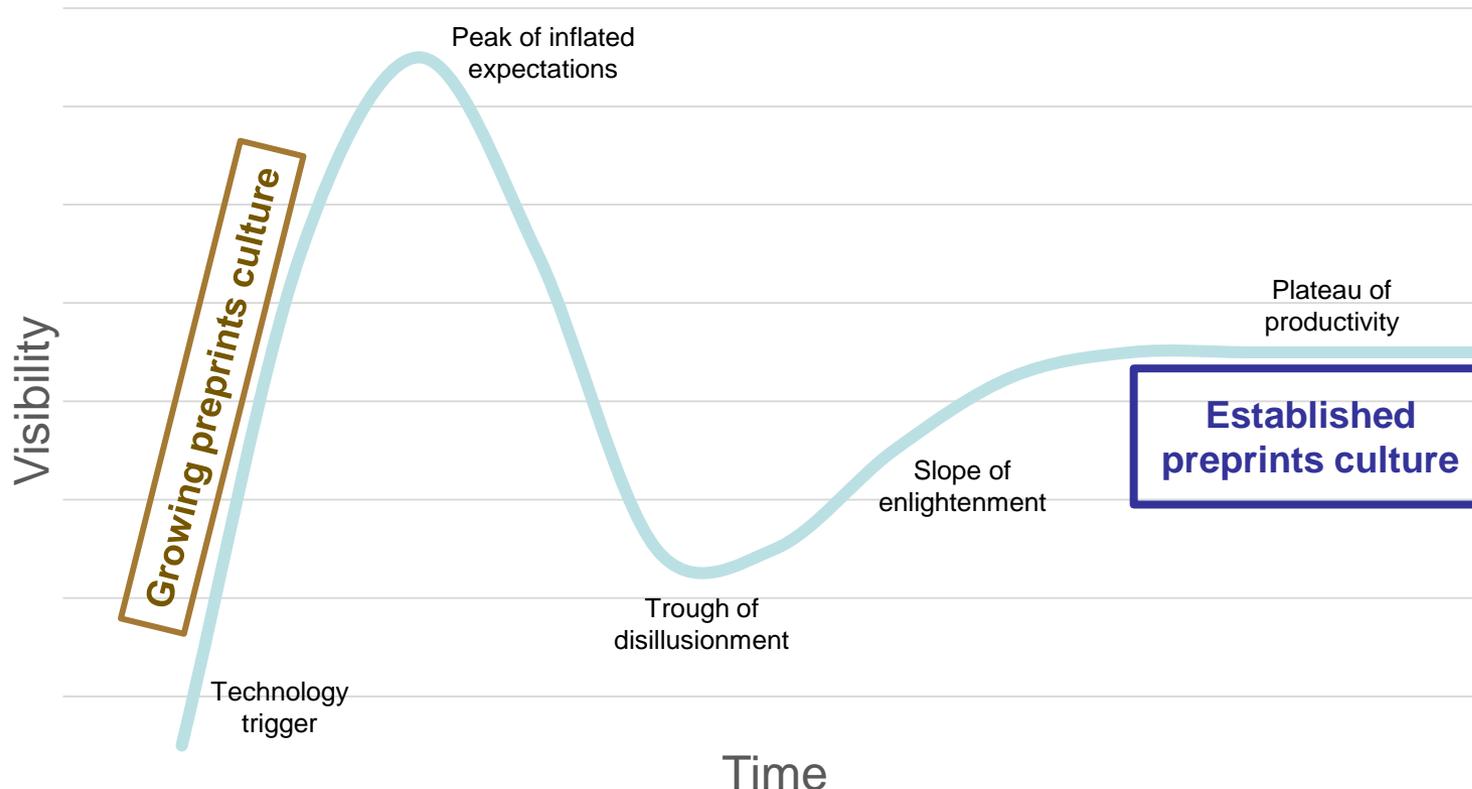
- Growing preprints culture
 - bioRxiv (2013): biological sciences
 - PsyArXiv (2016): psychological sciences
 - ChemRxiv (2017): chemistry



- Future developments
 - medRxiv (2019?): medicine and health sciences

Preprints and the hype cycle

The hype cycle can be used to qualitatively show the maturity of preprints in different disciplines through five phases:



Definitions

“The term ‘preprint’ itself implies that you are building it towards something; that it's only the ‘pre’-print and then something will come later from it. If there's nothing to follow the preprint then I would start to wonder what did happen. Why was the work dropped and left on this preprint level?”

Research Funder

Differing definitions: ambiguity is unavoidable in the landscape

A version of a paper ready to be submitted

A very early draft of a paper posted to receive comments from the community

A research output that hasn't been completed as a paper for review

A research output that is not expected to make it to the published stage (e.g. quality is too low, lack of necessity)

The author's accepted manuscript posted on a preprint server as a new version (even if this is, at least in theory, a post-print)

A version of an article uploaded to an institutional repository to comply with national/funder policies

Due to disciplinary differences, a definition cannot be artificially forced on the research community.

Most common ↑
↓
Least common



Discipline, culture and customs

“The practice of using preprints in psychology is not really well-established. I see that it's beginning and there are several people who are publishing their preprints but I wouldn't.”

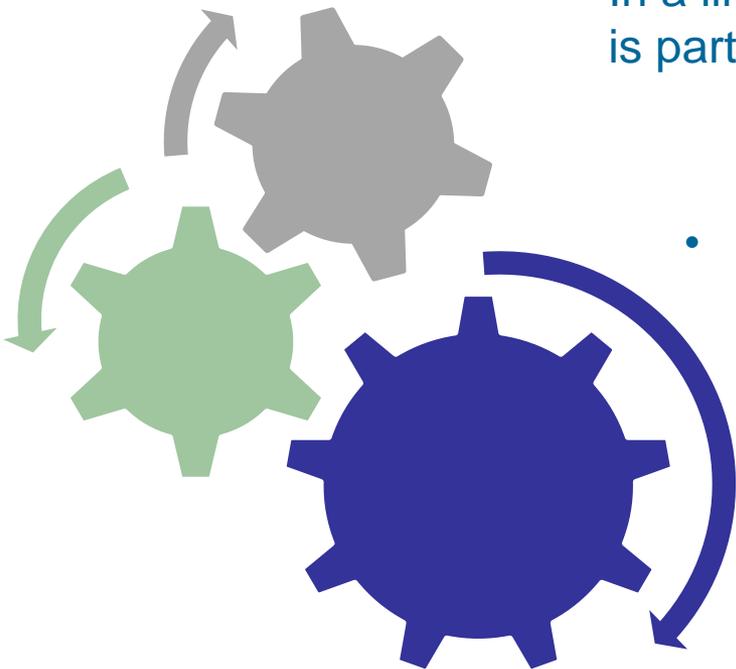
Researcher (psychology)

Disciplines, culture and customs

- Preprints are closely associated to the move to open science. The level of awareness of preprints is often higher when people are following developments in this landscape.
- Awareness and practices around preprints vary significantly by discipline and even within a single research area.
- Researchers tend to use discipline-specific servers for posting their work (where available) as opposed to generalist ones.
- Citing preprints is widely accepted but it would be helpful if servers could provide help regarding the best way this can be done.
- Researchers are often unaware of licensing options and their implications.

Position in the scholarly communication landscape

- A wide range of interviewees believe that preprints are an early-stage output in the publishing process.
- In a limited number of cases, preprint posting is part of the submission workflow.
- Some conferences are starting to use preprint servers to share submissions.



Compared to the relatively slow pace of the traditional peer-review and publication process, preprint posting has been described as “**science in real time**”.

The difference with academic publishing

“It's basically just like scientific publishing except it didn't go through the peer-review process, right?”



“But if you look at preprints, it's kind of really traditional. It looks like a published piece of research me.”



The vast majority of interviewees understood the proposition of a preprint.

There exist clear differences between preprints and published articles, with peer-review being the most significant one.

Practices, drivers and impediments in the use of preprints

POTENTIAL BENEFITS AND CHALLENGES

Potential benefits arising from preprints

	Benefit	Literature	Interviews
	Early and fast dissemination	✓	✓
	Increased opportunities for feedback	✓	✓
	Preprint servers as an outlet for 'homeless' results	✓	✓
	Advantages for early career researchers	✓	✓
	Preventing scooping	✓	✓
	Broader access to scientific research	✓	✓
	Increased citation counts	✓	✓
	Preprints can support collaborations	✓	✓
	Preprints in some formats (e.g. xml) and with open licences are easier to text and data mine	✓	✓
	Much shorter time before research can be shared, so authors remain enthusiastic about it	✓	
	Preprints may reduce predatory publishing	✓	

Potential benefits when posting preprints

Preprint servers as an outlet for 'homeless' results

The scope of preprint servers remains a key question for consideration.

Among our sample of interviewees, some consider preprint servers as outlets for pre or post-review research articles only. Others believe all sorts of outputs can be shared as preprints.



This creates a risk of ambiguity in terms of:

Workflows

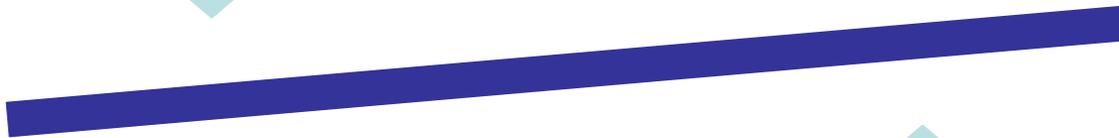
DOI creation and indexing

Licensing

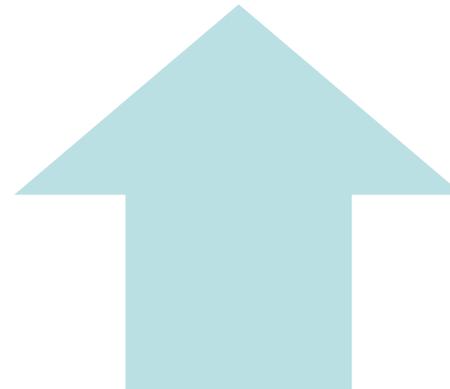
Striking the right balance



Interviewees were rarely able to provide examples supporting their comments and existing knowledge on the perceived benefits of preprints.



Early and fast dissemination to a broad audience is a compelling argument for different stakeholder groups and is the key driver of the movement.



Possible challenges when posting preprints

Challenge		Literature	Interviews
	Lack of quality assurance	✓	✓
	Limited use of commenting/feedback features on the servers	✓	✓
	Risk of the media reporting incorrect research	✓	✓
	Possible harm in the case of sensitive areas	✓	✓
	Questionable value of self-appointed reviewers	✓	✓
	Information overload	✓	✓
	The Ingelfinger rule – journals rejecting submissions if they have been posted as preprints	✓	✓
	Possible reputational damage to the poster if the preprint is not good enough		✓
	Possible ‘preprints wars’ in which the findings in one preprint are quickly attacked in another	✓	
	There may be a rush to post low-quality research about popular topics	✓	

Challenges may arise as a result of unusual unprofessional behaviours

Quality assurance

The quality may be lower than in a journal, but researchers do take this into account.

Preprints are seen as an initial stage of work and are treated accordingly.

Possible harm in the case of sensitive areas

Servers may carry out additional checks when sensitive topics are involved (e.g. MedRxiv).

Otherwise, the responsibility lies with researchers and other re-users.

Risk of the media reporting incorrect research

The consensus is that journalists and researchers are assumed to be responsible and professional when dealing with preprints.

This is, indeed, a risk, but not one that should occur when professionals work as expected.

Information overload

People are aware of this issue but are not particularly bothered by it as it already applies in the case of peer-reviewed literature.

Servers are aware of information overload and are thinking of ways to address this.

Trust is key

Trust is a recurring theme, along with the idea of responsible posting and re-use.



When it comes to published journal articles, *“researchers play down difficulties of establishing trustworthiness, not because there are none, but because they have well-developed methods of establishing trust.”*

Source: Nicholas, D., Watkinson, A., Volentine, R., Allard, S., Levine, K., Tenopir, C., & Herman, E. (2014). Trust and authority in scholarly communications in the light of the digital transition: Setting the scene for a major study. *Learned Publishing*, 27(2), 121--134. <https://doi.org/10.1087/20140206>

The determinants of trust in preprints



Stating “not peer-reviewed” as a watermark or banner is considered to be enough to inform readers:

- It is believed that not much else could be done; and
- It is the re-user’s job to be responsible when reusing information found online.



Trust in a given preprint typically varies based on whether:

- The preprint is widely discussed on social media;
- The preprint has received comments online (e.g. on the preprint server);
- The preprint has already been cited;
- The preprint has been reported on by a magazine/newspaper;
- A colleague has recommended the preprint;
- The preprint server itself is seen as credible.

Practices, drivers and impediments in the use of preprints

INFRASTRUCTURE AND FUNDING

Infrastructure



Current technologies seem largely suitable to support the uptake of preprints. For instance:

- DOIs or permalinks can be assigned to preprints;
- Withdrawals are possible on preprint servers;
- Open licensing options are offered.

However:

- Versioning features are not used by many authors;
- Automatic tracking of a manuscript through the publication process may be difficult and costly;
- Digital preservation remains a concern due to its cost:
 - A large number of interviewees consider digital preservation a priority but recognise this is not currently done by most preprint servers due to cost pressures and the high extent of experimentation.
- In some cases, it may be difficult to identify that a given output is a preprint based solely on its metadata.

Current models for preprint servers

Standalone preprint servers

e.g. bioRxiv, arXiv

Standalone preprint servers using third-party technologies

e.g. ChemRxiv using Figshare infrastructure

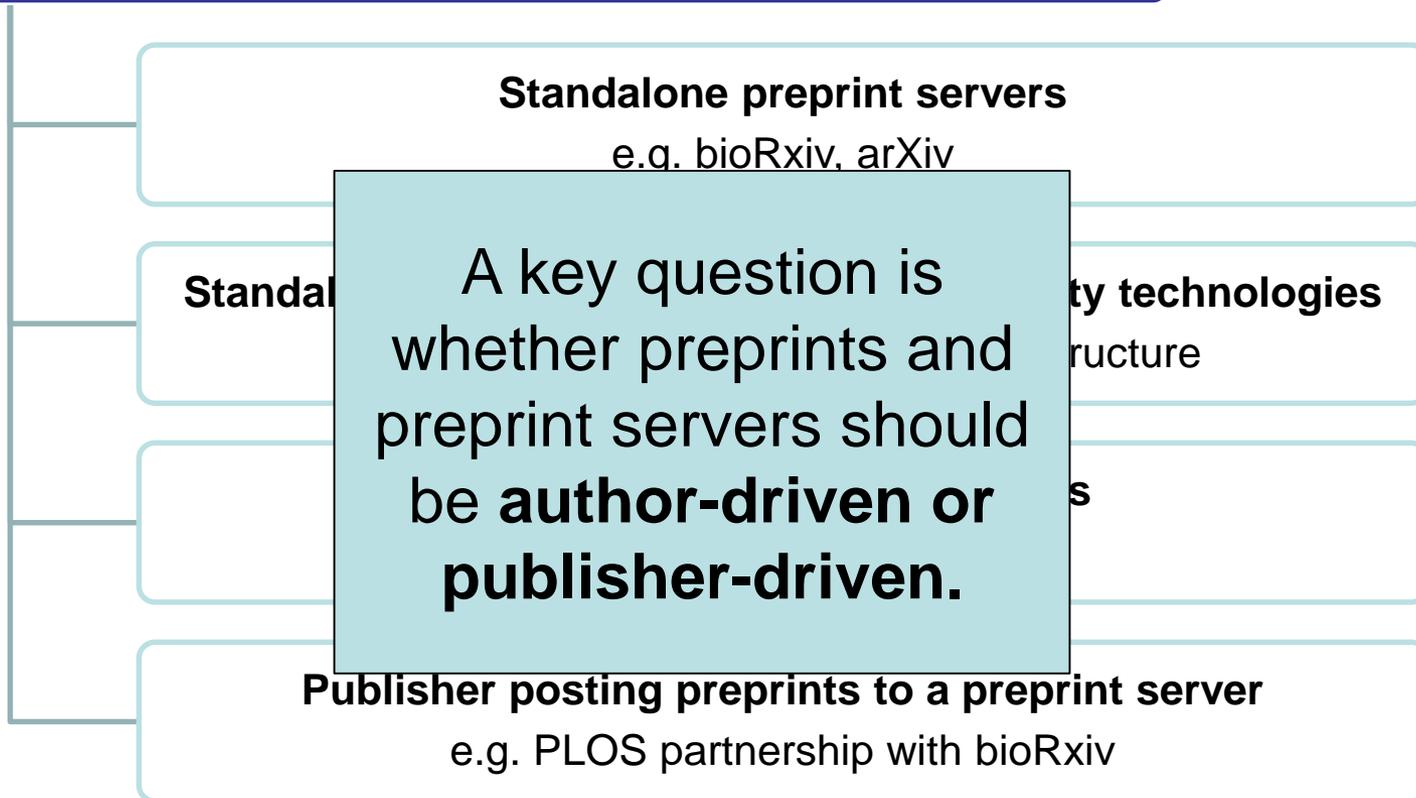
Publisher-supported preprints

e.g. PeerJ, F1000

Publisher posting preprints to a preprint server

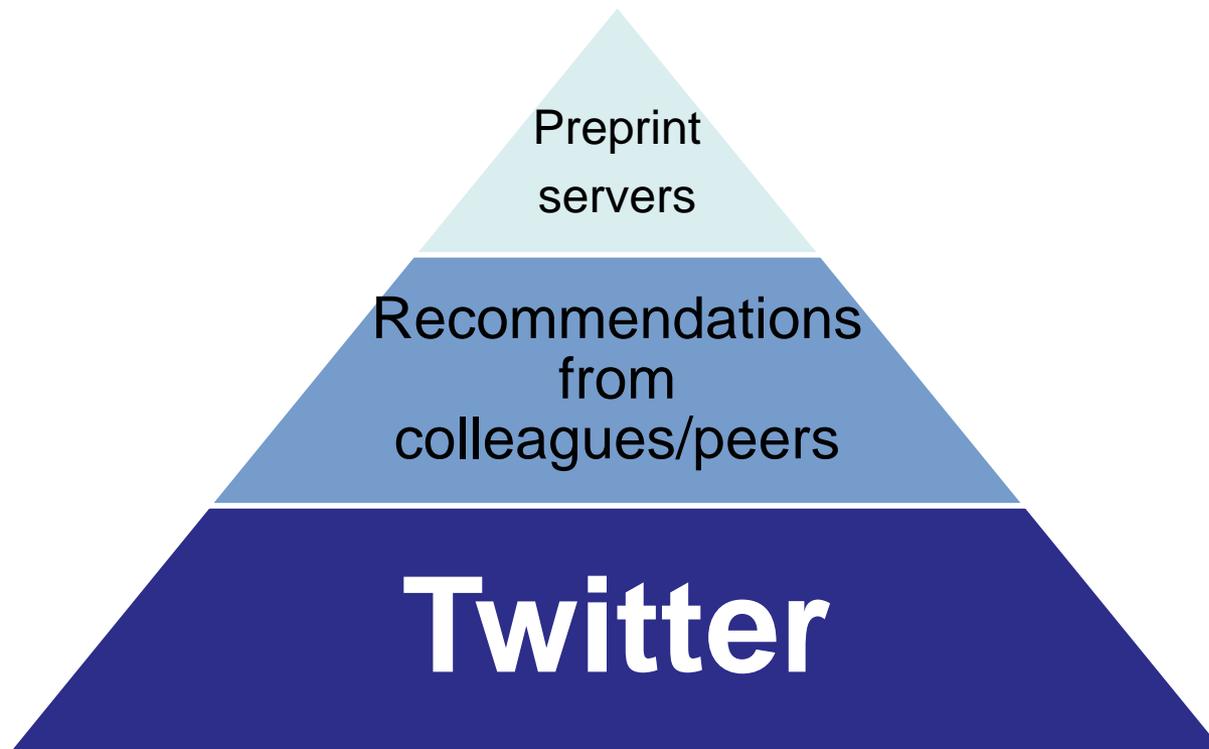
e.g. PLOS partnership with bioRxiv

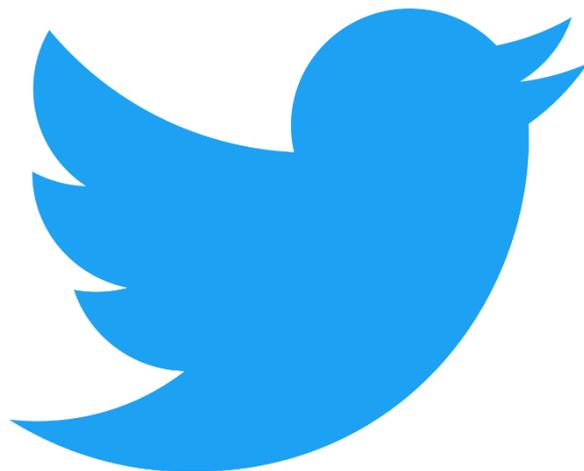
Current models for preprint servers



How are preprints discovered?

Based on our interviews, researchers and preprint servers often rely on Twitter for preprint discovery and sharing purposes.





3,990 followers



5,156 followers



27,400 followers

bioRxiv

Twitter is an open and publicly available medium that is being increasingly used by “closed” scientific communities. It partly addresses the issue of information overload and is used to:

- **Discover** new preprints posted by peers
- **Follow** Twitter bots posting preprints from specific preprint servers
- **Share** own preprints
- Make and receive **comments**
- **Contact** publishers of high-impact journals when a preprint receives significant social media attention

5,156 followers



27,400 followers

bioRxiv

3,990 followers



Policy

“Preprints are usually not acceptable for the purposes of national evaluation exercises, so they are not even part of the equation for universities. The author's accepted manuscript is the currency we deal with.”

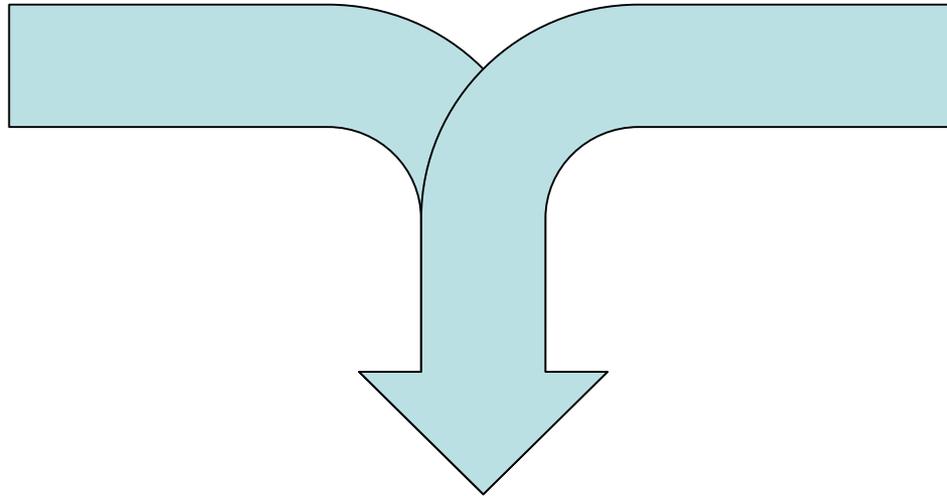
Research performing organisation



The position of research funders and academic journals on preprints is not always consistent, likely as a result of the fast-changing environment.

What do peer-reviewed open access and preprints have in common?

Peer-reviewed
open access

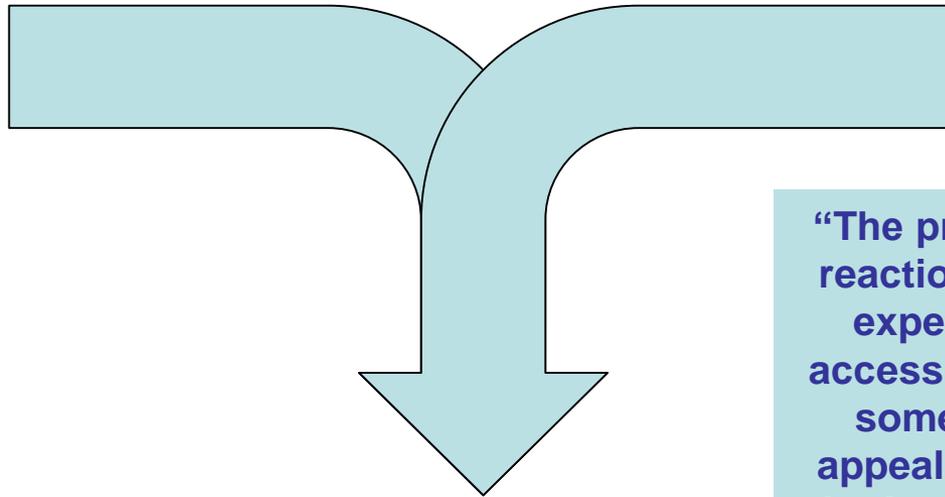


Preprints

**Research
outputs can
be viewed
by the
general
public**

What do peer-reviewed open access and preprints have in common?

Peer-reviewed
open access



Preprints

“The preprint agenda is a reaction against the very expensive Gold open access that is required by some funders. It may appeal to those who lack the funding for Gold open access.”

Researcher (psychology)

Desired direction of travel

Not for profit or for profit?

Not for profit models (e.g. via consortia) seem to be preferred either due to future sustainability or ethical reasons – a publisher-neutral approach is desired by the interviewees.

The role of publishers

Consolidation of the academic workflow by commercial organisations (publishers) was highlighted as a concern in the landscape in general, including preprints.

Urgency

As servers in the disciplines considered tend to be relatively new, business models remain immature. A high degree of experimentation was reported in the interviews.

Preprints have been suggested as an alternative to peer-reviewed open access



Richard Sever 

@cshperspectives

Plan U: just mandate preprint deposition and let a downstream ecosystem of overlays/journals with various business models evolve in response to community needs. Side benefit: speeding up science massively...

1. Solves the access problem
2. Makes research available ASAP
3. Allows everyone to experiment (or not) with peer review so we can really explore how/when/if to evaluate work in C21st.
4. Makes 3) easier because hosting, DOI, etc. already taken care of by bioRxiv, etc.

Business Models

- If preprints were to become an important contributor to the scholarly communications landscape, a number of considerations that are currently somewhat disregarded would apply, e.g.:
 - Coordination and inclusion in existing scholarly/publishing workflows;
 - Approaches to digital preservation;
 - Preparation of machine-readable xml versions of the preprints.
- The above would require significant investment: could the same money be better invested on other open access or open science initiatives, i.e. **what is the opportunity cost of preprints and preprint servers?**
- Other important considerations would include:
 - Resourcing at universities to support researchers with respect to preprints;
 - Ownership of preprint servers;
 - Direct support of the current operations of preprint servers;
 - Support of long-term preservation infrastructure, where suitable (e.g. if articles are OA, their preprint version has value only as a version but should not be used for other purposes).

Practices, drivers and impediments in the use of preprints

THE FUTURE OF PREPRINTS

Perceptions of preprints and the Innovation Diffusion Theory

Knowledge	All interviewees chosen were already aware of preprints. However, we note that there is uncertainty around what 'the rules of the game' are: while people may be aware of preprints, the extent to which they are familiar with their value proposition varies.
Persuasion	For some, the hypothetical advantages are clear but examples are difficult to find: case studies may fill this gap. Some researchers are unsure whether posting a preprint may limit their chances of publishing. Research institutions may not have sufficient time and resources to promote and support preprints.
Decision	In some cases, the "Decision" stage is strongly affected by the behaviour of peers, e.g. a co-author wishing to post a preprint. In other cases, the decision to post is supported by a belief in open scholarship and transparency. The rejection of preprints is often due to lack of uptake within a disciplinary community. In any event, 'trialability' is important before a decision is made.
Implementation	Experimentation was mentioned often in our interviews. It applies to preprint servers and overlay platforms in the first place, but also to some researchers who are trying to see whether preprints can be beneficial to them – this is also related to the idea of trialability.
Confirmation	Some interviewees reported that their or someone else's preprints gained attention and feedback, particularly on Twitter. Feedback was sometimes received from important people within their disciplinary communities (e.g. researchers and editors), which may lead to an improved article, new connections or publication in prestigious journals.

Appropriate behaviours when posting and considering preprints

The general consensus among project participants was that:



Researchers should be allowed to include preprints in their CVs, and these should play a role in researcher evaluation (even if limited compared to peer-review articles).



Researchers should be allowed to include preprints in funding applications.



Preprints have not been peer-reviewed, so they should not be considered as an alternative to peer-reviewed open access – they can, however, complement open access.

The future of preprints

“There needs to be an intrinsic interest of the research community to communicate via preprints. I don't think preprint posting can be enforced top-down or from anyone other than the research community and specifically the disciplinary communities themselves.”

Research funding organisation

“As long as the peer-review process exists and is assumed to have a quality-improving impact on scientific manuscripts, then the final peer-reviewed version of the manuscript must be the version that everybody relates to.”

Research performing organisation

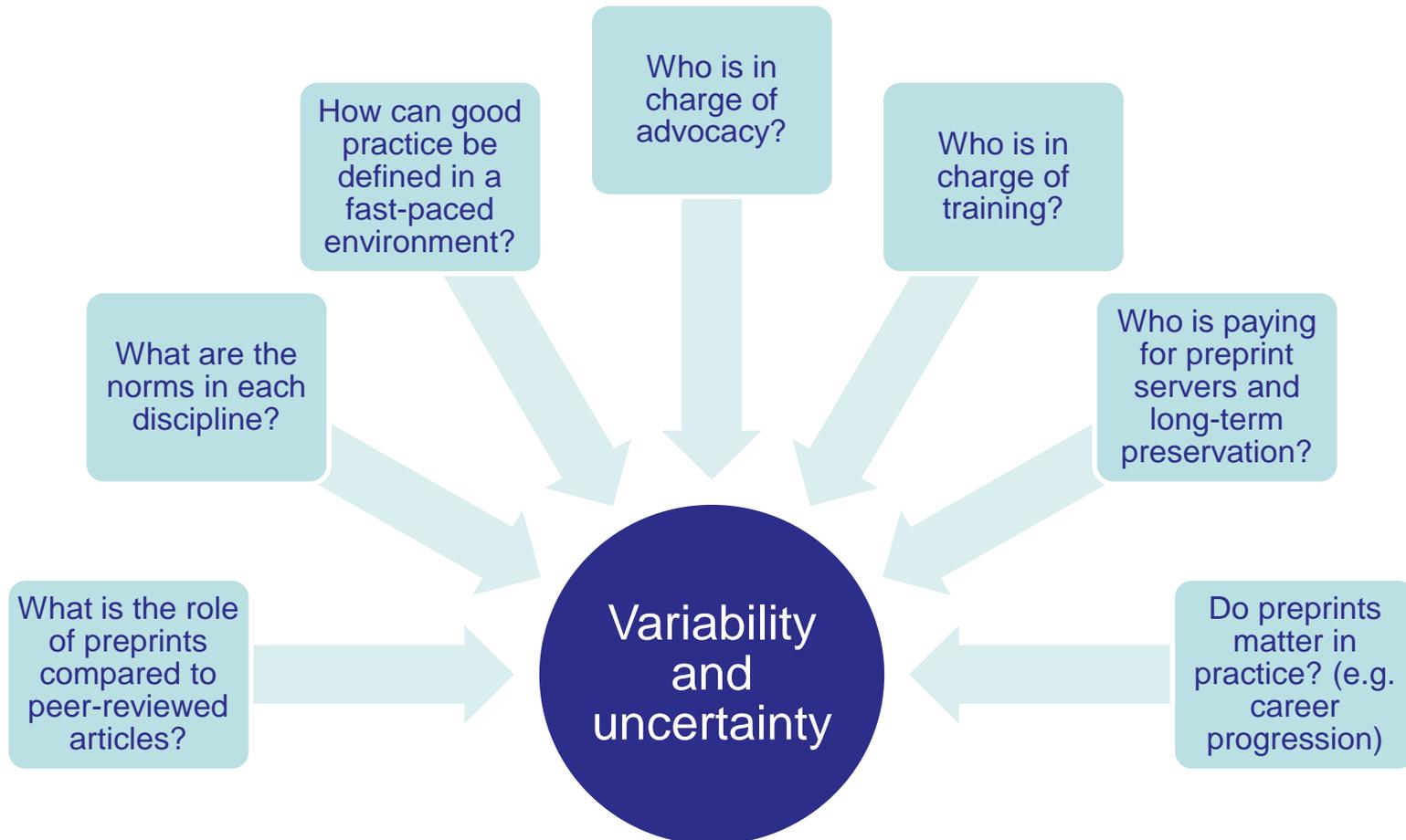
The future of preprints

- Uptake is increasing, but this varies widely between disciplinary communities.
- Future uptake will be affected by the importance of preprints when it comes to researcher evaluation.
- Some potential benefits, such as increased feedback, often fail to materialise, as comments are only seen on about 10% of preprints in the case of two of the preprint servers considered.
- Some of the challenges appear to be hypothetical and would only show in cases of unprofessional behaviours or misconduct.
- Twitter is playing a very significant role, so its integration in preprints workflows and discovery should be considered carefully.

Practices, drivers and impediments in the use of preprints

CONCLUSION AND NEXT STEPS

Preprints exist in a complex environment



The rate of adoption of preprints

Perceived attributes

- The proposition of preprints is clear to most. However, not everyone is convinced that posting preprints is appropriate. It appears that the effort to prepare yet another research output for posting might be a key obstacle, particularly for senior researchers.

Communications channels

- The key communication channel in the preprints arena is Twitter. The vast majority of interviewees highlighted this and the impact it is having on preprint discovery. A large number of people are exposed to their very first preprint on Twitter.

Extent of promotion efforts

- Promotion efforts are limited and it is unclear whose role this should be. Stakeholders in the open science arena are promoting preprints within their circles and online. Some funders (e.g. EC, Wellcome) are making explicit efforts to promote preprints, but more significant and broader support (including from publishers) are required for higher uptake.

Nature of the social system

- Preprints are dealt with differently based on whether people are early adopters of open science practices. In most other cases, preprints are considered as an important development but scepticism still has to be overcome (e.g. with respect to practical advantages, funding streams and long-term preservation).

The rate of adoption of preprints

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Extent of promotion efforts

Monitoring and enforcing policies around preprints presents significant challenges, including the range of technical solutions that might be available for this. Therefore, it is difficult for funders go beyond simply encouraging the use of preprints and recognising their importance* in reforming scholarly communications.

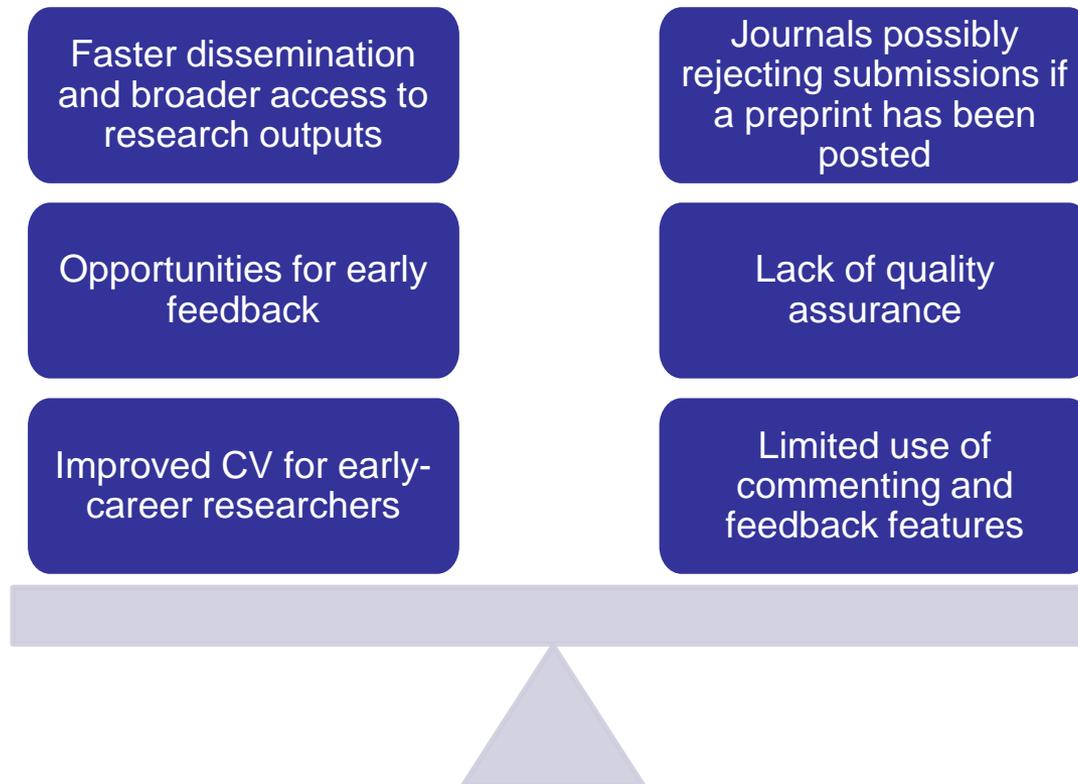
*Source: <https://publications.europa.eu/en/publication-detail/-/publication/464477b3-2559-11e9-8d04-01aa75ed71a1/language-en>

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Key incentives and disincentives for researchers

Based on the interviews carried out and on our understanding of the scholarly communications landscape, we believe the key incentives and disincentives for researchers are as follows:



Different users of preprints

Some researchers tend to be **early adopters** and...

- Follow community trends
- Commit to new approaches to support open science
- Embrace the potential benefits of preprints, believing that these will materialise

Other researchers tend to be **sceptical** and...

- Fear that journals might reject their manuscript if a preprint has been posted
- Distrust preprints as lacking peer-review and validation from the community
- Believe that preprints might be 'yet another job'

The role of KE

“It is better to address the preprint landscape at transnational or at least EU level, as opposed to the national level. It would be good for KE to play a role in this, as they could highlight differences between countries and disciplines.”

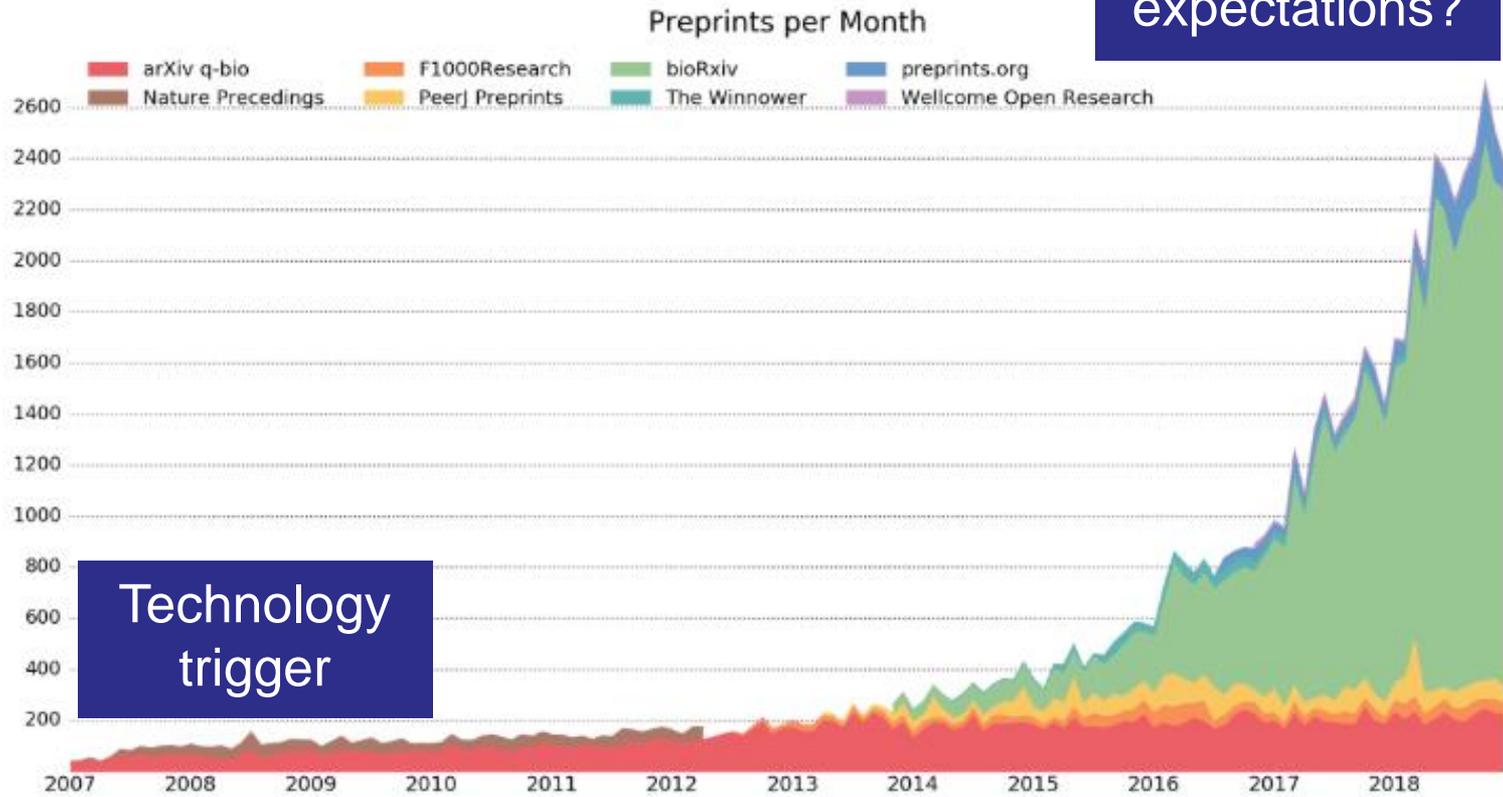
Research performing organisation

Conclusions

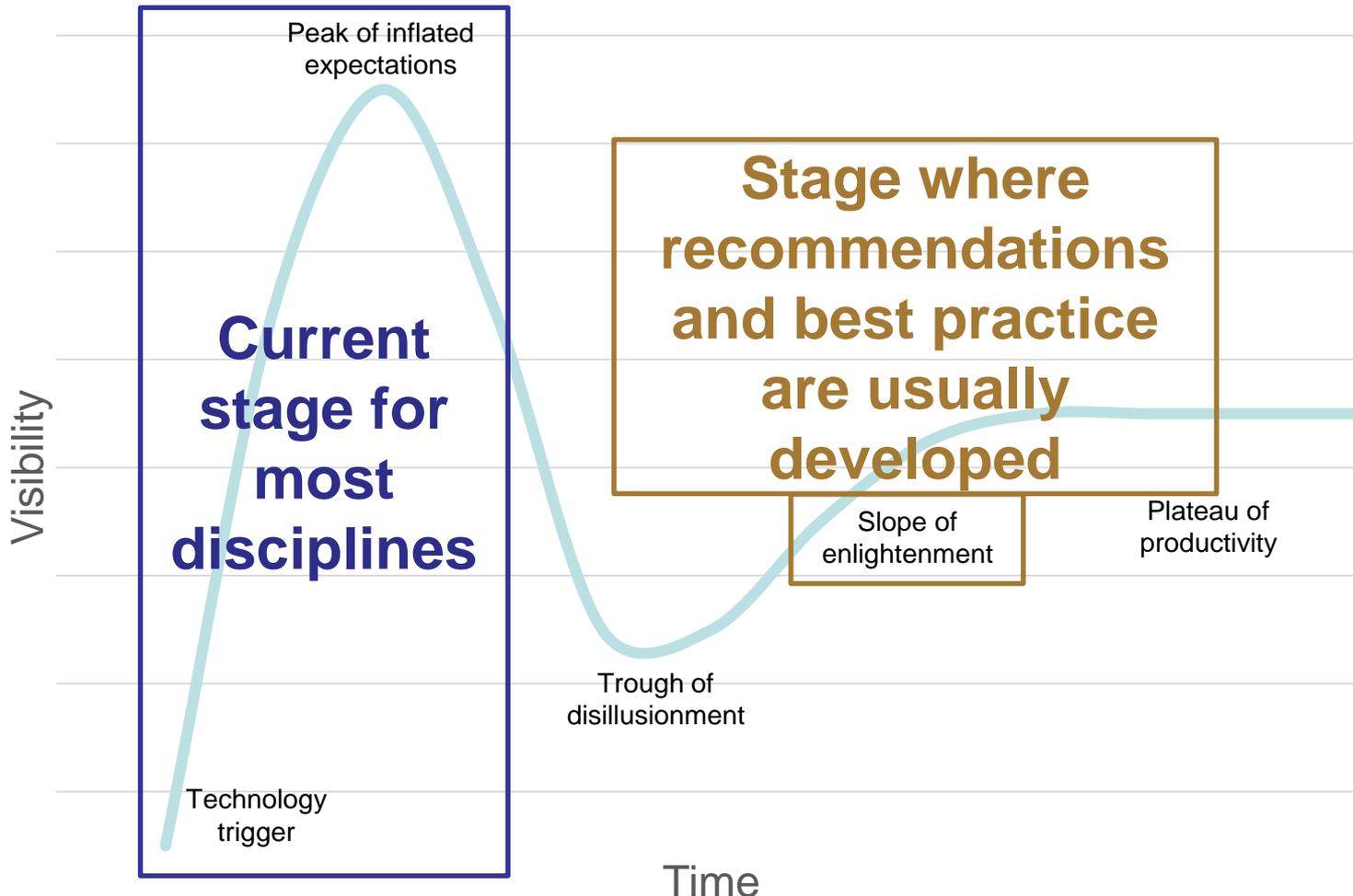
- This study shows that the preprints landscape is **highly fragmented and uncertain**.
- It should be accepted that the **definition** of a preprint will vary based on disciplinary norms, as this landscape is immature. This complicates matters when it comes to high-level considerations, policymaking or training, but it is not expected to be an issue for researchers in practice.
- **Experimentation** plays a significant role, but the supporters of preprints are convinced of their practical benefits.
- The **technology to support preprints is available**, but integration in existing academic workflows is a key gap.
- Supporting the uptake of preprints means **pursuing efforts at different levels**: researchers could post more preprints, but they would (at least) need support from institutions and acceptance by funders and publishers.

Another look at the hype cycle...

Peak of inflated expectations?



Another look at the hype cycle...



Legend


All stakeholder groups


Research funding organisations


Research performing organisations


Preprint servers


Academic publishers

High priority

Medium priority

Low priority

We have considered and ranked a series of options for future work based on interview findings and our understanding of the scholarly communications landscape.

However, we note that **our interviews did not highlight the need for recommendations or guidelines as a matter of priority.**



Position of re-publisher

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Use of preprints in HR processes and evaluation



Use of versioning and relationship with Green OA (e.g. to what extent can post-review preprints support or even replace institutional repositories when it comes to Green OA?)



Approaches to preprint citation

Legend


All stakeholder groups


Research funding organisations


Research performing organisations


Preprint servers


Academic publishers

High priority

  Position of research funders and publishers with respect to preprints

 Business models, governance, funding structures and sustainability

  Use of preprints in HR processes and evaluation

Medium priority

 Approaches to long-term preservation

  Integration within existing publishing workflows

  Definition of most appropriate pathways to advocacy

  Use of versioning and relationship with Green OA (e.g. to what extent can post-review preprints support or even replace institutional repositories when it comes to Green OA?)

Low priority

  Discussion of roles and responsibilities when it comes to training and awareness raising (e.g. to what extent should universities support researchers?)

 Approaches to preprint citation

Phase 2

In phase 2 of this work, we propose to focus on the dissemination of the Phase 1 findings via the following activities:



- Presentation at LIBER and Open Repositories conferences
- Sharing of findings by Stephen Pinfield at conferences/lectures



- Preparation of a blog post summarising the findings
- Sharing of the slide deck and summary on the KE website



- Preparation of a full report including the findings of Phase 1 and additional context from further desk research



- Preparation of a structured social media strategy
- Promotion of the slide deck and report via Twitter



Thank you

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Appendix A – Limitations of the study

- We would like to highlight the following limitations of this study:
 - The approach followed can be classified as convenience sampling. The stakeholders involved were those who were available during our interviewing period and willing to participate. As a result, the sample of individuals consulted is not representative of the overall community and outlying results may be over-represented.
 - The scope of this study did not include academic publishers, who play a significant role in the area of preprints. We recommend that publishers are represented in future stages of this work so as to ensure their point of view is clearly acknowledged and included in the discussion.
 - The considerations arising from our interviews have been highlighted through a process of qualitative coding. This largely relies on individual skills and interpretation and, therefore, may be difficult to replicate in some cases.

Appendix B – Acknowledgements

Our thanks go to the whole Knowledge Exchange Task and Finish group on preprints and to all who kindly contributed to this project.

Research funders

Name	Country	Affiliation
Angela Holzer	Germany	DFG
Jan Philip Solovej	Denmark	The University of Copenhagen
Jyrki Hakapää	Finland	Academy of Finland
Marleen Bink	Netherlands	ZonMW
Robert Kiley	UK	Wellcome Trust
Zoe Ancion	France	Agence Nationale de la Recherche

Appendix B – Acknowledgements

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Research performing organisations

Name	Country	Affiliation
Arjan Schalken	Netherlands	Vrije Universiteit van Amsterdam
Birgit Schmidt	Germany	Göttingen State and University Library
Charlotte Wien	Denmark	University of Southern Denmark
Danny Kingsley	UK	Cambridge University Library
Martina Knoop	France	Centre national de la recherche scientifique (CNRS)
Mikael Laakso	Finland	Hanken School of Economics
Olaf Siegert	Germany	ZBW - Leibniz Information Centre for Economics
Serge Bauin	France	Centre national de la recherche scientifique (CNRS)

Appendix B – Acknowledgements

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Preprint servers

Name	Country	Affiliation
Benjamin Brown	USA	PsyArXiv Steering Committee
John Inglis	USA	Cold Spring Harbor Laboratory Press (bioRxiv)
Martyn Rittman	Switzerland	MDPI
Stephanie Dawson	Germany	ScienceOpen

Appendix B – Acknowledgements

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Other service providers

Name	Country	Affiliation
Kathleen Fitzpatrick	USA	Humanities Commons
Laurent Romary	Germany	Inria
Liz Allen	UK	F1000 research
Michael Markie	UK	F1000 research

Appendix B – Acknowledgements

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Engaged researchers (reading and posting preprints)

Name	Country	Affiliation
Daniel Lakens	Netherlands	TU Eindhoven
Felix Schonbrodt	Germany	LMU München
Jan Jensen	Denmark	University of Copenhagen
Julie Aspden	UK	University of Leeds
Karolina Urbanska	France	Université Clermont Auvergne
Michael Fischer	Germany	University of Bremen
Peter Murray-Rust	UK	University of Cambridge ContentMine
Thomas Battram	UK	University of Bristol

Appendix B – Acknowledgements

Our thanks go to the whole Knowledge Exchange Task and Finish group on preprints and to all who kindly contributed to this project.

Unengaged researchers (only reading preprints)

Name	Country	Affiliation
Alice Lebreton	France	Ecole Normale Supérieure de Paris
Antica Culina	Netherlands	Netherlands Institute of Ecology (NIOO)
Antonio de la Vega de Leon	UK	University of Sheffield
Katie Drax	UK	University of Bristol
Natalia Soshkinova	Germany	Institute of Molecular Biology
Richard Tunney	UK	Aston University
Sam Smith	UK	University of Leeds
Thomas Lösch	Germany	Universität Bamberg

Appendix C – Full coding structure

- **Definitions**
 - Main elements
 - Definitions vary by discipline
- **Position of preprint in the scholarly communication landscape**
 - Where preprint servers stand in the landscape particularly re journals
 - Historical development – how we got to where we are
- **Infrastructure**
 - Management of withdrawals and retractions
 - Enabling open licensing
 - Versioning on preprint servers
 - Interoperability and DOIs
 - Digital preservation
 - Preprint discovery
 - Main elements
- **Policy**
 - Preprints for career advancement/researcher evaluation
 - Preprints in research proposals
 - Preprints vs. Open access
 - Preprints at different policy levels
 - National
 - Funder
 - Institutional
 - Journal
- **Preprints as an assets (benefits)**
 - Preprint servers as a place for “homeless” results
 - Early and fast dissemination
 - Proof of productivity
 - Increased citations
 - Preventing scooping
 - Increased downloads
 - Sharing via Twitter and role of Altmetrics
 - Increased opportunities for feedback
 - Advantages for early-career-researchers
- **Preprints as a liability (disadvantages)**
 - Quality assurance
 - Comments on preprints vs peer-review
 - Preprints undermining ‘blind’ peer review
 - Impact of self-appointed reviewers
 - Journals and IF as a proxy for quality
 - Role of overlay platforms in quality assurance
 - Necessity of basic ‘screening’ by preprint servers
 - Information overload
 - Role of not-peer-reviewed research in a reputation economy
 - Fear of premature exposure
 - Media picking up non-peer-reviewed research

Appendix C – Full coding structure

- **Discipline, culture and customs**
 - Levels of awareness and adoption
 - Standing of preprints varies by discipline
 - Citing preprints
 - Standardising preprint citation
 - Acceptance by academic journals
 - Expectation that preprints will be published in journals?
 - Preprints in sensitive areas
 - Communicating the value of preprints in disciplines where they don't appear relevant
 - Is stating “not peer reviewed” enough?
 - Uncertainty around contractual obligations re preprints
- **Financial sustainability and business models**
 - Funding/sustainability
 - For-profit vs not-for-profit models
 - Consolidation of academic workflow providers
- **The future of preprints**
 - Uptake of commenting features
 - Role of preprints vs institutional repositories
 - Advocacy
 - Roles and responsibilities
 - Who's in charge of advocacy?
 - Preprints are not a priority
 - Overlay platforms as a locus for experimentation and fresh ideas
 - Role of preprints in journal clubs