

Introduction

In vitro experiments comprise a significant proportion of biological research, yet research publications often lack information that enables readers to assess the reliability of the findings.^[1-2] *In vitro* models also provide significant opportunities to replace animal research. For these models to be credible, and for the research community to have confidence in them, it is important that research using these models is reported to the same standard expected of animal experiments.

To address this, the NC3Rs convened a working group to develop reporting standards: the Reporting *In Vitro* Experiments Responsibly (RIVER) recommendations – now available as a preprint.^[3] We are now assessing the value of this guidance for the design, conduct and reporting of *in vitro* experiments.

Developing the RIVER recommendations

The working group comprises an international, diverse cohort of experts from across the scientific community with representation from academia, industry, government agencies, statisticians and methodologists, journals and funding organisations to ensure the recommendations are appropriate to a wide range of users.

Core principles that were applied when developing the recommendations were:

- Focus on reliability.
- Prioritisation of small number of recommendations to facilitate adoption by journals and researchers.
- Applicability to any *in vitro* experiment.
- Inclusion of accompanying explanations.

User testing the RIVER recommendations

We are currently running a study to road test the recommendations. We aim to recruit 10-15 *in vitro* researchers – this number is sufficient to identify 80-90% of the issues in usability testing.^[4]

We are using purposive sampling to enrol participants from a variety of countries, research fields and career stages, who use diverse types of *in vitro* experimental models (see User testing recruitment participant characteristics range below).

What's next?

- Complete user testing study – four participants recruited so far.
- Revise the RIVER recommendation based on feedback from users.
- New online resource to support *in vitro* researchers in improving the quality of *in vitro* publications.
- Promote use of RIVER in partnership with journals and funders.

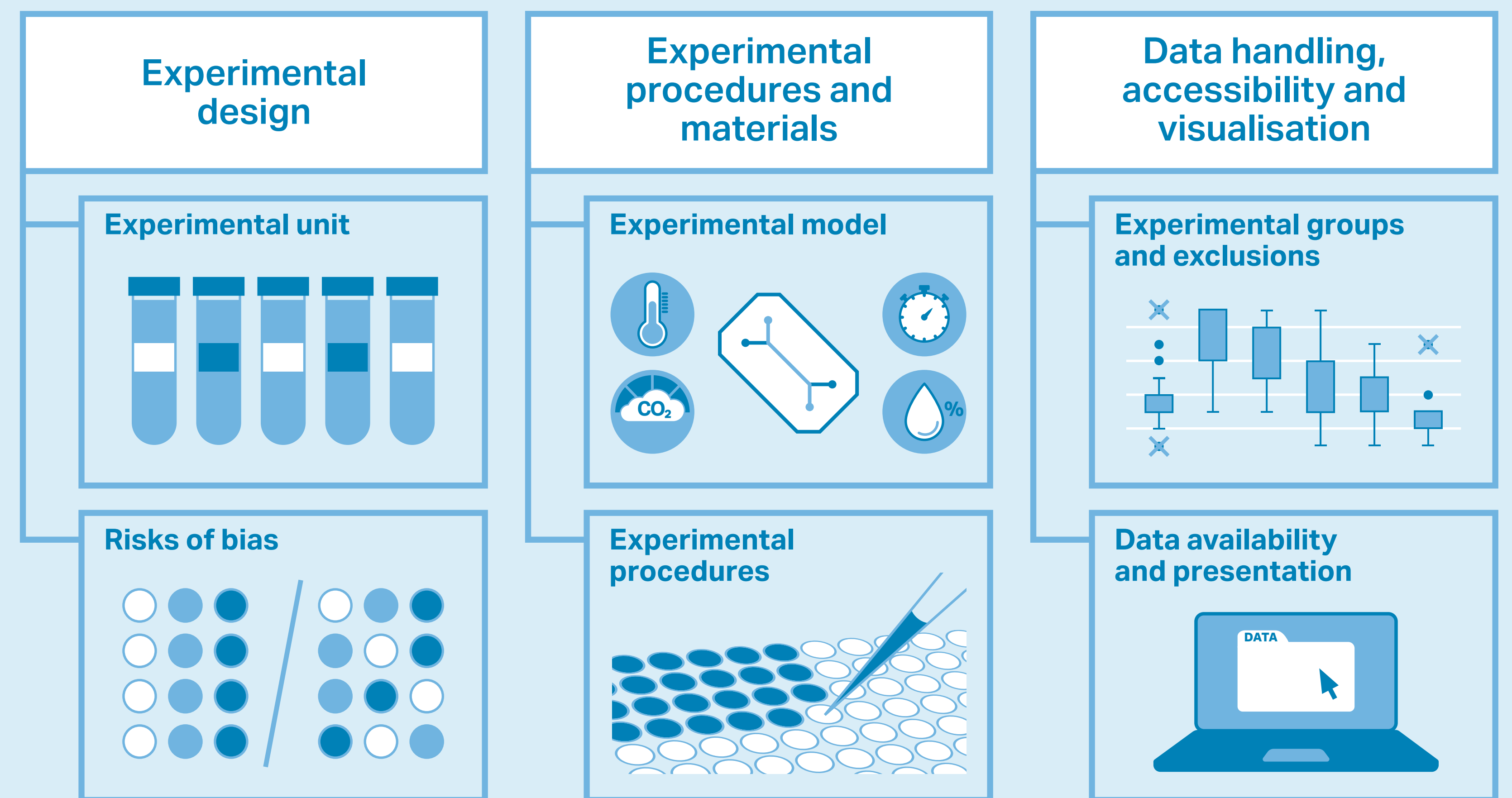
Can you help to recruit participants for the user testing study?



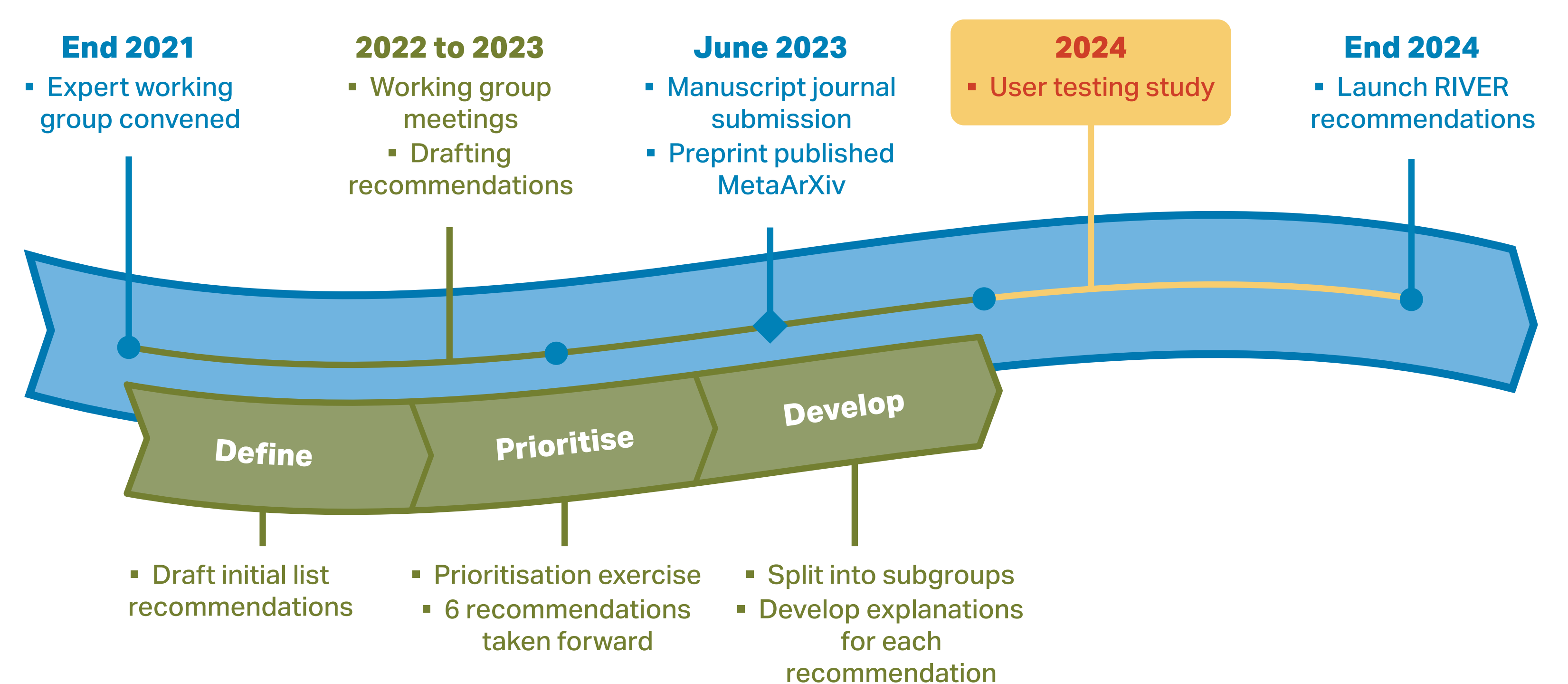
Find out more at:
www.nc3rs.org.uk/river
or contact river@nc3rs.org.uk

The RIVER recommendations:

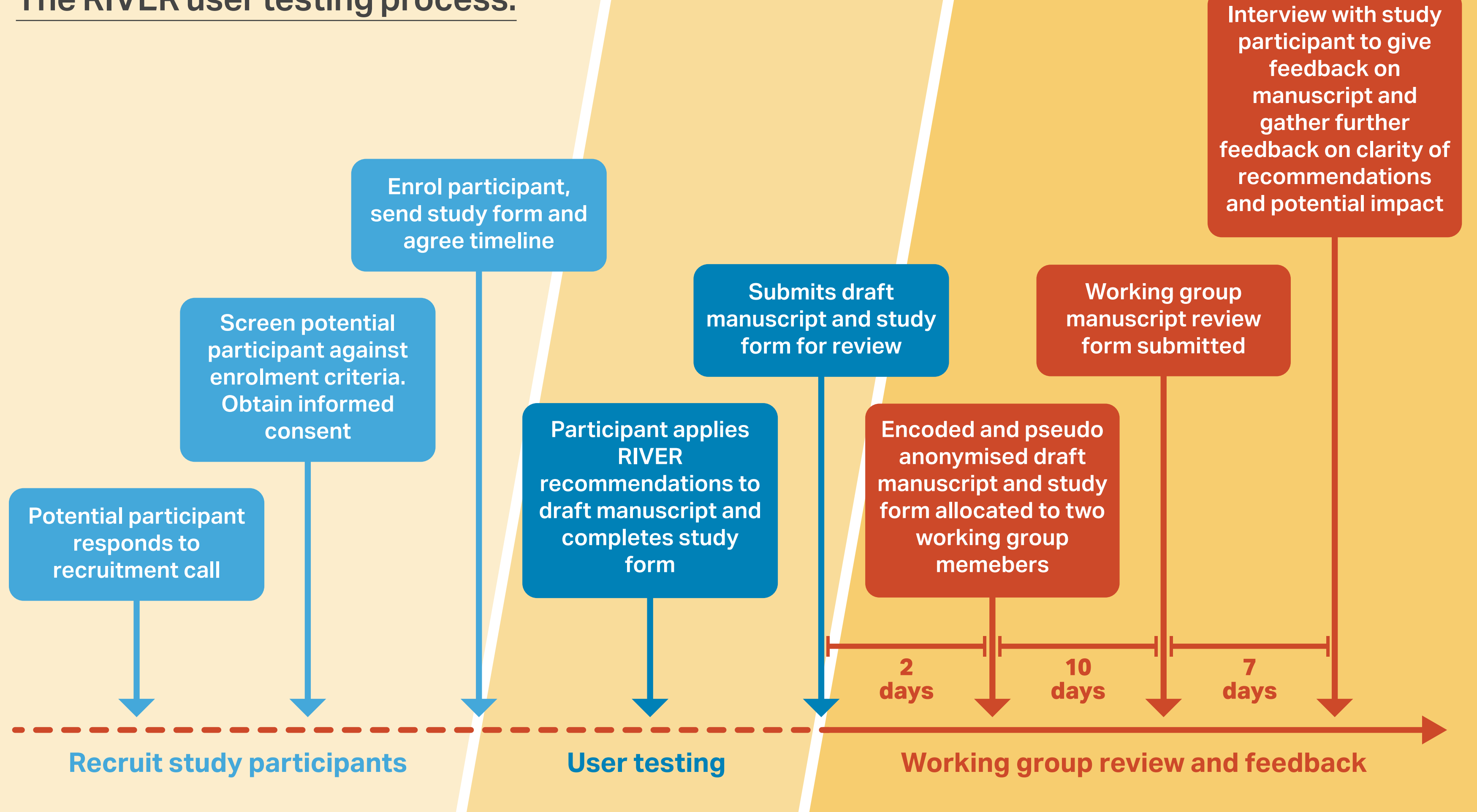
The six recommendations cover the minimum information necessary for a reader to assess the methodological rigour and reliability of the study. They are accompanied by detailed explanations, providing the rationale and supporting evidence behind each recommendation and the information that should be reported to satisfy them.



The process of developing the RIVER recommendations:



The RIVER user testing process:



User testing recruitment participant characteristics range:

Category	Example
Type of <i>in vitro</i> model	2D / 3D cell culture, organoid, microphysiological systems, organ-on-chip, etc.
Field of research	Neuroscience, cancer, toxicology, etc.
Career stage	Student, early career researcher, group leader
Type of research environment	Academia, industry, contract-research organisation, government-funded
Country of residence	UK, China, USA etc.
English as first language	Yes/No

References

- [1] Hirsch C, Schildknecht S (2019). *In Vitro* Research Reproducibility: Keeping Up High Standards. *Front Pharmacol*. doi:10.3389/fphar.2019.01484
- [2] Gosselin RD (2021). Insufficient transparency of statistical reporting in preclinical research: a scoping review. *Scientific Reports*. doi:10.1038/s41598-021-83006-5
- [3] The RIVER working group (2023). Reporting *In Vitro* Experiments Responsibly – the RIVER Recommendations. *MetaArXiv Preprints*. doi:10.31222/osf.io/x6aut
- [4] Faulkner L. (2003). Beyond the five-user assumption: benefits of increased sample sizes in usability testing. *Behav Res Methods Instrum Comput*. doi:10.3758/bf03195514