Extended reality (XR) research

A Citizen Science Approach

Stereopsia Europe 2023
Brussels, 18-20 October 2023

Revised reference edition, November 2026

Prepared and presented by

Judy Love Gonzales Malundo

Founder and Chairperson, MCSA

lovemalundo@mcsinternational.com

Ten principles for citizen science

1. Meaningful public roles in research.
2. A genuine scientific outcome.
3. Benefits for researchers and contributors.
4. Options to join several research stages.
5. Feedback to contributors.
6. Attention to bias and limitations.
7. Responsible openness of data and results.
8. Acknowledgement of contributions.
9. Evaluation of science and experience.
10. Legal, ethical and environmental care.

Summary of ECSA (2015), Ten Principles of Citizen Science. These are principles for practice, not guarantees of project outcomes.

Migrants as knowledge partners

Diversity & Inclusivity

Respect

Empowerment

Honesty & Integrity

Integration

Humility

Fairness

Empathy

Ask who can influence the research and what support makes participation possible.

MCSA core values (2023).

What citizen science involves

Members of the public contribute to research that generates knowledge.

Roles may include observations, interpretation and shared decisions about questions, methods or how findings are shared.

Describe the actual responsibilities; participation varies between projects.

Paraphrased from ECSA (2015) and Haklay et al. (2021).

Recognition, support and fairness

Recognition	The 2021 Europe chapter described a policy-recognition gap in Lithuania.
Support	Value contributions, provide resources and give participants feedback.
Fairness	Engaged research can make room for knowledge that would otherwise be overlooked.

Vohland et al. 2021, p. 41 (Lithuania); Sforzi et al. 2018, pp. 441-442; Holliman 2017. Context and support matter.

A critical lens for XR

Lens or concept	What it helps us examine
Feminist reflection	Power, representation and differences within groups.
VR perspective-taking	A designed experience to discuss and evaluate.
Virtual embodiment	Experiences of a virtual body or perspective.
Embodied cognition	How bodily action and context shape experience.

A critical lens examines power and representation.
An XR experience needs dialogue and evaluation.

Mohanty 1988; Herrera et al. 2018; Herrera and Bailenson 2021. Application to XR is the author's conceptual proposal.

A consortium snapshot

CORDIS project listings in the research snapshot

Project	Listed consortium entries
EO4EU	18
XR4Human	11
SUN	17

Where can community knowledge enter, and what can people decide?

Original CORDIS screenshot; capture date not supplied. Consortium-entry counts are not individual participant counts or demographic evidence.

Migrant involvement in XR research

MCSA proposes bringing migrant experience into the research process.

Questions	Invite people to help define what is worth investigating.
Design	Examine cultural, gendered and other assumptions in XR experiences.
Interpretation	Discuss whose perspective is represented, missing or treated as typical.

MCSA position in the original 2023 presentation. Inclusion and reduced bias are aims to evaluate, not established results.

Participation, reflection and evaluation

Participation needs reflection on power.

A citizen science approach can be paired with feminist analysis of who defines the problem, whose experience is represented and how decisions are made.

Use VR to prompt reflection. Test its effects and discuss assumptions with the people represented; outcomes depend on the task, setting and measure.

Author's conceptual proposal. Mohanty 1988; Herrera et al. 2018; Herrera and Bailenson 2021.

References 1

European Citizen Science Association. (2015). Ten Principles of Citizen Science. ECSA.

https://doi.org/10.17605/OSF.IO/XPR2N

Haklay, M. (M.), Dörler, D., Heigl, F., Manzoni, M., Hecker, S., and Vohland, K. (2021). What Is Citizen Science? The Challenges of Definition. In K. Vohland et al. (Eds.), The Science of Citizen Science (pp. 13-33). Springer.

https://doi.org/10.1007/978-3-030-58278-4_2

Vohland, K., Göbel, C., Balázs, B., Butkevičienė, E., Daskolia, M., Duží, B., Hecker, S., Manzoni, M., and Schade, S. (2021). Citizen Science in Europe. In K. Vohland et al. (Eds.), The Science of Citizen Science (pp. 35-53). Springer.

https://doi.org/10.1007/978-3-030-58278-4_3

References 2

Sforzi, A., Tweddle, J., Vogel, J., Lois, G., Wägele, W., Lakeman-Fraser, P., Makuch, Z., and Vohland, K. (2018). Citizen science and the role of natural history museums. In S. Hecker et al. (Eds.), Citizen Science: Innovation in Open Science, Society and Policy (pp. 429-444). UCL Press.

https://discovery.ucl.ac.uk/id/eprint/10066348/1/Chapter%20%2029.pdf

Holliman, R. (2017). Supporting excellence in engaged research. Journal of Science Communication, 16(5), C04.

https://doi.org/10.22323/2.16050304

Mohanty, C. T. (1988). Under Western Eyes: Feminist Scholarship and Colonial Discourses. Feminist Review, 30(1), 61-88.

https://doi.org/10.1057/fr.1988.42

References 3

Herrera, F., Bailenson, J., Weisz, E., Ogle, E., and Zaki, J. (2018). Building long-term empathy: A large-scale comparison of traditional and virtual reality perspective-taking. PLOS ONE, 13(10), e0204494.

https://doi.org/10.1371/journal.pone.0204494

Herrera, F., and Bailenson, J. N. (2021). Virtual reality perspective-taking at scale: Effect of avatar representation, choice, and head movement on prosocial behaviors. New Media & Society, 23(8), 2189-2209.

https://doi.org/10.1177/1461444821993121

European Commission CORDIS. (n.d.). XR4Human: The Equitable, Inclusive, and Human-Centered XR Project (Grant agreement 101070155). Related official record for the original presentation snapshot; screenshot capture date not supplied.

https://cordis.europa.eu/project/id/101070155