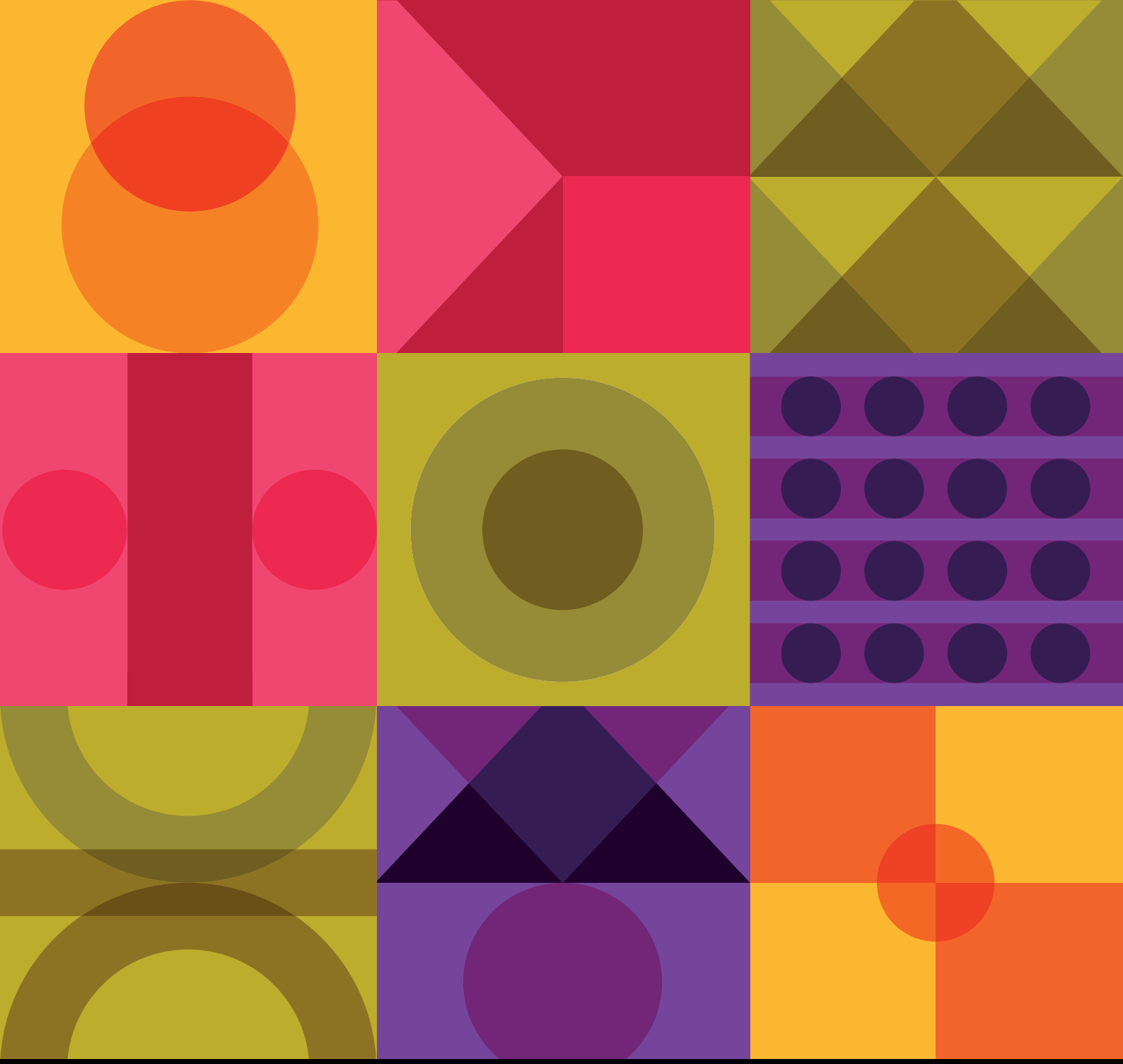

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Executive summary

The future of minds and machines

How artifical intelligence can enhance collective intelligence

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In *The future of minds and machines: how AI can enhance collective intelligence* we argue that most AI has focused on a relatively narrow set of applications - automating human tasks or helping individuals become more efficient. Little attention is given to the opportunity in using AI to augment and enable collective intelligence for addressing social challenges. This risks missing a key opportunity to solve the complex problems faced by society, from the climate crisis to social inequality. These problems require new approaches that optimally combine collective human effort and machine intelligence, and yet we lack the vocabulary and understanding of how to bring these two fields together.

In this report, we analyse the relationship between artificial intelligence (AI) and collective intelligence (CI) using real-world examples of AI & CI in practice, develop a framework for how AI can be used to empower groups to think and act together in new ways and highlight design trade-offs at the heart of navigating this opportunity.

Sections 1 to 5 provide a short introduction to the fields of artificial intelligence and collective intelligence and discuss how they can come together to enhance the possibilities of both fields to solve complex societal problems. Within this we analyse the different challenges to making the most of CI that could be addressed through AI, including information overload, coordination and digital infrastructure issues, and how to optimise interactions between individuals in a group.

Section 6 presents an emerging framework for understanding the four different ways that AI interacts with CI - *Machines working on data generated by people and sensors*; *Machines and people taking turns to solve problems together*; *People and machines solving tasks together at the same time*; *Using machines to connect knowledge and tasks in groups*. Building on this framework, Section 7 describes the crucial role CI methods play in the development of AI, from using CI for better training data, opening up innovation, auditing and monitoring, to enabling better diversity all along the AI lifecycle.

Sections 8 and 9 outline common pitfalls of AI & CI integration and the design choices at the heart of AI for CI, for projects and organisations interested in experimenting with AI and CI integration. These include trade-offs between efficiency and engagement, using the 'good enough' AI models to ensure transparency and interpretability and balancing the costs associated with AI & CI at both project and systemic levels.

We conclude the report with **six recommendations** for how we can make the most of this opportunity through new approaches to policy, funding and research.

Recommendations

The first major funder to put £10m into this field will make a lasting impact on the future trajectory for AI, create new opportunities for stimulating economic growth as well as more responsible and democratic AI development. The policy makers and innovators that change the emphasis of their AI policies and technology development towards collective intelligence and applications of AI in the public interest will have a first mover advantage and be recognised as global leaders in this emerging field.

Policy Makers

Put collective intelligence at the core of all AI policy in the United Kingdom.

- The UK Government should adapt AI policy to reflect the widest possible collective benefits from AI applications, as well as emphasising diversity and broad participation in the development of AI.
- The Office for AI, BEIS and DCMS should promote methods where AI enables citizen innovation, and the AI Council should use emerging AI & CI models and use cases to inform their work on data, narratives and skills of AI.
- The Office for AI and Government Digital Service should update their guidance on using AI in the public sector to include specifications for AI & CI.

Create testbeds for experimentation to accelerate learning.

- So far experimentation in AI & CI has been ad hoc. Creating dedicated regional or sectoral testbeds allows for experimentation in real-world settings. This could help stimulate private and public sector collaboration and accelerate learning about best practice in AI & CI for public benefit. We see specific opportunities for innovation in three areas: *Digital democracy*, *Environment, energy and climate* and *Healthcare and wellbeing*.

Funders

Launch a new dedicated funding programme for AI & CI research and development.

- There are currently no large-scale funding opportunities in the UK for AI & CI research and development. This gap should be filled by UKRI and foundations such as Wellcome Trust, Open Society Foundations and Luminate.
- Public funders should also focus on integrating AI & CI opportunities into existing AI funding programmes.

- Current AI4Good funding by foundations should shift towards a clearer focus on how AI can empower collectives.

Invest in new partnerships and governance models for AI & CI experiments.
The relative disconnect between the fields of AI and CI, and failures of systems-level coordination and governance threaten the success of AI & CI projects.

- Funders need to incentivise interdisciplinary collaboration between the two fields of AI and CI by making funding criteria contingent on a partnership approach.
- Independent organisations like the Ada Lovelace Institute and Open Data Institute should provide guidance on new models of data trusts and oversee public auditing of AI used in the public sector.

Research & practitioners

Build a new interdisciplinary field and link to real-world practice.
There is currently no academic institution or discipline dedicated specifically to understanding the field of AI & CI in the UK.

- Research organisations like the Alan Turing Institute and Oxford Internet Institute should launch dedicated research and teaching programmes on AI & CI.
- Progress in the field could be further advanced through the creation of a dedicated international academic journal which strengthens the links between different research fields and practice-based CI.

Accelerate progress on AI & CI research by committing to open science and evaluation.
A number of systemic interventions are necessary to ensure the continued growth of the field. Researchers should:

- Apply the FAIR principles[1] to data management and follow emerging guidance on sharing data and code to encourage transparency and ensure reproducibility.
- Openly publish feasibility studies and costs associated with AI & CI solutions.
- Develop new criteria for AI & CI design and new benchmarks to measure performance and impact evaluation (see *Practice - getting the design of AI & CI projects right*).

The report also presents a number of specific recommendations and project questions for practitioners interested in developing AI & CI projects[2]. These questions are intended to guide more in-depth consideration of the integration of AI and CI. Practitioners should use them to help plan their project, and as a starting point for its evaluation.

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[1] https://www.go-fair.org/fair-principles/
[2] https://www.nesta.org.uk/report/future-minds-and-machines/10-recommendations/

About the report

The future of minds and machines: how AI can enhance collective intelligence was written by Aleks Berditchevskaia and Peter Baeck at the Centre for Collective Intelligence Design, Nesta.

This is a short summary of the research and recommendations. This report has interactive elements and is best viewed online. The full report can be found online at https://www.nesta.org.uk/report/future-minds-and-machines/

Cover design by Lily Scowen.