*Commentary*

# A Framework for Human-Centered AI: Bridging the Economics of the Digital Divide and Solving the Problem of Demographic Implosion

**Yoshija Walter** [1,2,3,*]

[1] Institute for Management and Digitalization, Department for Business, Kalaidos University of Applied Sciences, 8050 Zurich, Switzerland

[2] Laboratory for Cognitive Neuroscience, Faculty of Mathematics and Natural Sciences, University of Fribourg, 1700 Fribourg, Switzerland

[3] Institute for Philosophy, Philosophical-Historical Faculty, University of Bern, 3001 Bern, Switzerland

* Corresponding author. E-mail: yoshija.walter@kalaidos-fh.ch (Y.W.)

Human-centered AI is a manifesto for technology that serves humanity's broad spectrum of needs and aspirations. It involves embedding ethical considerations, transparency, accountability, and inclusivity at every stage of AI development. This approach seeks not only to prevent harm and bias but to actively promote human welfare, dignity, and rights. Yet, there are only vague ideas in the literature on how human-centered AI should look like and what it should accomplish.

Frameworks for human-centered AI vary in scope and application but commonly advocate for [1]:

- *Ethical Alignment:* Ensuring AI decisions and processes are guided by ethical principles and societal values.
- *User Engagement:* Involving diverse users in the design process to ensure AI solutions are accessible, beneficial, and user-friendly.
- *Transparency and Explainability:* Making AI systems and their decisions understandable and interpretable to users and stakeholders.
- *Continuous Oversight:* Ensuring ongoing human interaction, monitoring, and intervention in AI systems to maintain control and adaptability.

To ensure human oversight over AI, there are three main concepts reflecting various levels of human intervention from direct involvement to complete automation [2]:

1. *Human-in-the-Loop:* This involves humans directly in the decision-making process of AI systems. The AI proposes solutions, but a human makes the final decision or provides feedback to improve the AI's learning. It is commonly used in scenarios requiring high accuracy or ethical considerations.
2. *Human-on-the-Loop:* The human oversight is more passive. The AI operates autonomously but humans monitor and can intervene if necessary. This approach is a balance between automation and human control, ensuring that AI actions remain aligned with desired outcomes.
3. *Human-out-of-the-Loop:* Here, AI systems operate independently without human intervention in real-time decision-making. Humans are involved only in the design, setup, or periodic review. This is suitable for environments where AI can operate safely and reliably on its own, or where speed and efficiency are paramount.

Despite the progress in developing ever better AI models, the rapid advancement of AI technology presents continual challenges. The increasing complexity and autonomy of AI systems necessitate a dynamic and responsive approach to governance and oversight. Frameworks must evolve to address new ethical dilemmas, integrate emerging societal values, and adapt to changing technological landscapes. Moreover, human-centered AI should be oriented towards promoting values strengthening humans and society, and therefore should provide solutions to pressing problems such as the digital divide and the current rapid implosion of global demographics.

The digital divide, a stark manifestation of inequality, impedes the equitable distribution of technological benefits. It represents the gap between those who have access to digital technology and the skills to use it effectively and those who do not. This gap can exist on different levels: Geography (i.e., people living in regions with low internet access), age (older people might be confronted less with technological tools), income (poor people may have less access to technology), and academics (not all people have access or the cognitive aptitude for the same education and training). Bridging this divide is not merely a technological challenge but a socio-economic imperative that involves (i) enhancing access to the technology, (ii) promoting digital literacy, and (iii) ensuring economic inclusion.

Human-centered AI offers a significant promise in addressing these challenges, capable of personalizing and optimizing solutions for diverse needs. It can revolutionize education, healthcare, and much more, making services accessible to all. Yet, this comes with the responsibility to ensure ethical development and application of AI, avoiding biases and protecting individual rights. Future research must focus on harnessing the potential ethically and effectively, making it a cornerstone in bridging the digital divide and advancing a more inclusive society.

Moreover, there is a new global threat arising [3]: The world faces a demographic implosion, marked by declining birth rates and an aging population. This trend poses profound economic, social, and cultural challenges, including labor shortages, increased healthcare and pension costs, and shifts in societal cohesion. The reasons behind declining fertility rates are multifaceted. Amongst them we find economic pressures, societal lifestyle changes, postponed educational maturity, non-family friendly journalism by the media, health concerns, and difficulties to establish a thriving life-work balance. Perhaps one of the major reasons exacerbating this trend is found in digitalization and the implementation of AI itself. On social media, we are constantly bombarded with dopaminergic distractors, meaning that their business models are deliberately targeted towards getting users hooked or even addicted to staying as long on the platforms as possible. This might reduce the incentive to spend time with others and ponder life's virtues, most likely in a discouraging fashion since AI algorithms are programmed to propel the most "clickbaity" content to all users. It means that the content with the most extreme opinions, the most scandalous outlooks, and the highest hedonistic fun-advertisements become more strongly engrained in people's minds than balanced and friendly perspectives. Hence, AI content creation and curation has likely evolved to promote the young, beautiful, independent, successful, career-focused, and child-free lifestyle.

Up until now, it seems like AI has decisively *not* been used to foster human-friendly values and demographic stability. However, there is reason for hope since human-centric AI holds unprecedented opportunities to counteract these trends by promoting positive narratives and providing support around a balanced lifestyle, meaningful duties, family values and parenting. By leveraging data, AI can personalize content to inspire and reassure individuals about the joys and feasibility of starting a family and investing in relationships. It can connect people through resources, communities, and services that make the challenges of childbearing more manageable and fulfilling. AI can therefore become a catalyst for change in countering the fears leading to the current demographic implosion. This involves: (i) Nudging towards positivity through continual reassurance, (ii) empowering with information by providing helpful knowledge useful for the person's present situation, (iii) building supportive communities by facilitating the right connections through adequate platforms, and (iv) advocating policy change by promoting healthy family planning on a societal and political level. However, it is important that AI is programmed to respect an individual's freedom, making sure that it avoids manipulation against a person's wishes and ensuring that the content is accurate, diverse, and non-coercive.

Hence, as AI is often seen as a harbinger of disruption, it likewise holds the potential to be a powerful ally in promoting a balanced, sustainable demographic future. By aligning AI development with human-centered values, focusing on bridging the digital divide, and proactively addressing demographic challenges, we can steer technological advancement towards outcomes that not only respect but also enhance human dignity, community, and prosperity. The path forward requires a commitment to ethical, inclusive, and responsive AI that actively contributes to the well-being and flourishing of all humanity – including the family and marginalized individuals with less access to the technology. With thoughtful stewardship, AI can help forge a future that celebrates and supports life in all its forms, ensuring a thriving world for generations to come. To ensure this, we need to actively work on human-centered AI. This is an ethical, social, and economic imperative.

## Ethics Statement

Not applicable.

## Informed Consent Statement

Not applicable.

## Declaration of Competing Interest

None to declare.

## References

1.  Shneiderman B. Human-Centered AI. *Issues Sci. Technol.* **2021**, *37*, 56–61.
2.  Shneiderman B. *Human-Centered AI*; Oxford University Press: Oxford, UK, 2022.
3.  Lianos TP, Pseiridis A, Tsounis N. Declining population and GDP growth. *Humanit. Soc. Sci. Commun.* **2023**, *10*, 1–9.