

Inflection Point: Multi-Agent AI and the Future of Cartographic Practice and Knowledge Production

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Abstract:

As artificial intelligence (AI) technology advances, the cartographic and GIS professions are experiencing a profound transformation. The mapmaking and GIS industries are at an inflection point – a moment when external, systemic developments completely rewrite the future trajectory of tertiary markets and knowledge production (Grove, 1996). This paper explores the potential of multi-agent AI systems to redefine how maps are made, designed, and used. It will also discuss how AI may reshape the roles of professional cartographers in the field. Multi-agent AI is already offering groundbreaking innovations such as conversational interfaces, displacing traditional graphical user interfaces, and user-centered automation that enables unprecedented efficiency in map design and spatial analysis workflows.

Through the lens of market inflection, the cartographic profession is about to be turned on its head. Technical and software skills will become less critical; the ability to ask meaningful questions, even regarding design, will instead take precedence. This evolution promises to empower professionals to tackle complex visualization problems. On the flip side, however, there will be disruptions to workforce structures. In the short-term, market adjustments will include faster, more replicable workflows, and the automation of metadata management. In the long term, professionals will work alongside AI to conceptualize and refine sophisticated spatial solutions. Fewer trained cartographers will be required in the market. User-centered design will literally shift to the user, wherein the map user will be its creator, literally designing their own visualizations based on AI cartographic expertise.

Fortunately, human cartographers are still needed right now to successfully integrate AI into cartography and GIS software for several reasons. First, cartographic knowledge integration is not without challenges. Currently, AI is not positioned to replace professional expertise but to supplement and amplify it. Also, business concerns will actually slow AI development in the short-term. Similar to how Kodak was loath to switch to digital technology, because a majority of its income came from film and development technology, not photography itself, traditional cartographic software companies may be loath to create user-centered, single-source AI solutions for mapmaking. The potential workforce redundancy resulting from such software would devastate these companies' current economic model. Market change from AI technology, no matter how unpredictable, however, *is* inevitable. For example, companies like Google do not "sell" licenses for their mapmaking software. In such a scenario, the company is not beholden to traditional economic models.

This paper argues that the adoption of multi-agent AI marks a dramatic evolution rather than a demise for cartography. By fostering adaptability and a willingness to embrace emerging tools, the profession can navigate this technological transformation effectively. AI's integration into cartography and map design is not merely about efficiency; it is about expanding the boundaries of what cartography can achieve. User-centered design based on AI expertise and the needs of individual users will make cartography more accessible, useful, and fulfill more needs. The future of cartography in an AI-driven world is one of public collaboration. Though fewer traditional cartographers, and GIS software-based solutions, will be required, our discipline's body of knowledge as a whole will live and evolve forever and further with the help of non-human intelligence.

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References

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