

# Autonomous Agents and Cultures of Participation: Learning from Wikipedia

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## Abstract

The advancement of AI and machine learning technology warrants revisiting the fundamental components underlying cultures of participation. Not only the role of individual end-users, but also that of the community at large need to be revisited in the context of autonomous agents. In this paper, we review the impact that autonomous agents have (had) on Wikipedia, as a case in point of a culture of participation. We conclude with an outlook towards future directions of research related to the subject of this paper.

## Keywords

Wikipedia, Bots, Meta-design, Cultures of participation, AI

## 1. Introduction

End-user development (EUD), meta-design and cultures of participation are concepts that have been coined to frame ideas that propose a shift from professionally designed software systems towards more open systems that support end-users in engaging in personally meaningful domains.

With AI finally entering the realm of consumer, non-expert application domains, one should ask the question: How will the advent of AI influence EUD, meta-design and cultures of participation? More specifically, we should investigate what roles AI can play in progressing the ideas fundamental to the aforementioned concepts. And, correspondingly, how we might design future systems to leverage these potentially positive impacts of AI on these concepts.

Recent works have begun to scratch the surface of these questions by analyzing on various levels the relationships between the concepts of AI and EUD [1, 2]. Yet, these works have focused largely on the relationship between individual end-users and AI, more than the impact of AI on end-users being part of a wider community, or culture of participation.


In this paper, we want to take a first step in reflecting on what the role of end-users could be, and on what cultures of participation could mean in light of AI-powered, autonomous agents. Specifically, we draw from the rich experiences that have been described in literature on the use of *bots* in Wikipedia. Bots can be defined as "...system[s] situated within and part of an environment that sense that environment and act on it, over time, in pursuit of their own agenda and so as to effect what they sense in the future." [3]. While bots have existed for long in

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Wikipedia and current AI technology enables applications beyond those described in all but the most recent literature, we still believe that existing research on Wikipedia bots provides us with an excellent view into what happens to a community that no longer consists of only human agents.

In the remainder of this paper, we give a brief overview of the context of Wikipedia and then explore a number of key questions:

- How are power and agency distributed in cultures of participation with non-human agents?
- What role can automated agents play in content creation?
- What role can automated agents play beyond content creation?

Finally, we conclude with an outlook towards future directions of research related to the subject of this paper.

## 2. Wikipedia & bots

Wikipedia has often been highlighted as a prime example of a Culture of Participation (CoP) [4]. It embodies many of the qualities of a CoP, such as offering its users to engage with personally meaningful topics, and is fully designed towards facilitating end-users to engage in editing, creating and maintaining platform content. Precisely because it has been a long-standing and widely used environment, Wikipedia provides us with an excellent opportunity to reflect on the questions posed earlier in this paper.

While Wikipedia started as a project to allow (human) end-users to contribute knowledge to a collective encyclopedia, already soon after its conception, bots were appearing on the platform [5]. The introduction of these non-human editors passed not without debate, especially when *rambot* began adding article stubs for all US towns, thereby expanding the total number of Wikipedia articles at that time by more than 60% virtually overnight. [5].

Meanwhile, bots have been accepted as an integral and important part of the Wikipedia community. An extensive policy towards the user of bots in Wikipedia has been defined, including the roles that bots are expected to play within the community [6]. Their roles have expanded beyond mere creation of content into a wide variety of other tasks, such as managing meta-data (e.g., tagging articles, fixing links), protecting Wikipedia from harmful contributions and even guiding new users in creating meaningful contributions [7].

It is exactly this variety that makes Wikipedia interesting as an object of study when it comes to the role of AI in end-user development. Beyond content-related support (similar to the role of Github's AutoPilot aiding coding processes), bots on Wikipedia play a much more diverse role. For example, they provide community support by guiding newcomers, helping these users to get familiar with editing Wikipedia articles and with being a valued community member [7].

## 3. Exploring key questions

In this section we explore the three key questions regarding power, agency and role of autonomous agents in the context of cultures of participation that were raised earlier in this paper.

### 3.1. High-tech scribes all over again?

While the application of bots has an undeniably positive effect on peer contribution communities such as Wikipedia, it also comes with potential dangers. Earlier, we discussed end-user development being a paradigm that aims to 'liberate' non-expert end-users in that they gain a stronger voice in a society dominated by high-tech scribes [4]. However, introducing another level of technological complexity in the form of highly automated, artificially intelligent bots threatens to reinforce the initial problem of the high-tech scribes, just on another level of abstraction. After all, these bots are designed and programmed by those trained in the technologies required to implement the required functionality. In the case of bots powered by machine learning, this is a non-trivial endeavour for most end-users [1]. Since these bots are not necessarily free of politics (e.g., they enforce particular policies and changes upon Wikipedia [8]), this renders the before mentioned high-tech scribes in a potentially more powerful position than those with lower technical skills.

This problem has been acknowledged by other researchers, who argue that in line with the goals of Wikipedia, the choices underlying the machine learning algorithms that power Wikipedia bots should be opened up to the Wikipedia community, instead of remaining the domain of high-tech scribes [9].

### 3.2. Automated contribution of content

Fischer defined three components of cultures of participation: meta-design, social creativity and richer ecologies of participation [4]. By introducing non-human actors as part of an ecology of participation, the question is how the interaction between the human actors, and between the human actors and the non-human actors will change. And whether or not these changes positively impact the community.

Bots acting as autonomous agents who independently contribute large amounts of content to online communities such as Wikipedia are not always perceived positively, as we saw in the earlier example of Rambot [5]. While objectively the content they provide might be accurate and suiting the purpose of an encyclopedia, there is fierce discussion about whether bots should be enabled to automatically create large swaths of content, even if factually correct [10].

Turning to Fischer's components for cultures of participation, one could argue that autonomous bots, such as the ChatGPT fueled bots currently under discussion in the Wikipedia community, might not meet all criteria required for social creativity (diversity, independence, decentralization, aggregation). They draw their information from a shared, global source of information and thus fail the criteria for diversity and decentralization. But even if one would engineer bots that draw from local, decentralized knowledge sources, the question is if those bots would be accepted into ecologies of participation like Wikipedia.

Earlier research amongst Wikipedia contributors has identified that their involvement in the online encyclopedia is not merely utilitarian (i.e. because they believe it is necessary), but relates to perceived fun [11] and intrinsic self-motivation (i.e. because contributors think it represents their personal values and beliefs) [12].

Bots taking part in, or even dominating the process of contributing to Wikipedia could threaten human actors in drawing motivation from contributing to Wikipedia themselves.

It would likely turn the relationship between bots and humans in Wikipedia upside down, compared to the current situation. Instead of bots checking human contributions for errors, and correcting them, humans would end up checking bot contributions themselves. Human contributors might start to question the value of their contributions relative to those of the bots, and perhaps feel that the bots' contributions overshadow their contributions, making them feel unheard.

Indeed, Burtch et al. recently identified that the introduction of ChatGPT had a negative impact on the number of contributions to the online platform StackExchange.com [13]. They argue that the impact of generative AI technologies such as ChatGPT depends largely on a community's social structure: communities focused on information exchange, such as StackExchange.com might be less resilient than those with a strong social fabric, such as Reddit. They call for research focusing on the role such technologies could play to enhance social connectedness, rather than replacing user content generation.

### **3.3. Bots as assistants**

While in the previous sections we have focused mainly on the role of bots as content creators, Wikipedia bots also serve other roles (e.g., welcoming, notifying, or warning users). In general, beyond generating content, some important roles that bots can occupy in communities built upon user-generated content, are curation, recommendation and collaboration.

Earlier research on the application of meta-design in the context of physical rehabilitation found that end-users struggle with quickly assessing the applicability and quality of end-user generated content [14]. In this case, therapists sharing rehabilitation exercises reported feeling drowned in the available content, restricting them to using readily available content, rather than discovering new, potentially useful content by peers. Similarly, therapists had concerns about the quality of the content that was being shared.

Quality control and curation are tasks frequently performed by bots on Wikipedia. Wikipedia has an extensive quality control mechanism that shares responsibilities between bots and human editors, but heavily relies on bots being active. In fact, a study analyzing the consequences of a series of outages of a major quality-control bot found that without the bot's presence, processes in identifying and reverting vandalism on Wikipedia were severely hampered [15].

In relation to content discovery, bots could play an important role. Having the capacity to quickly process large amounts of information, bots could aid users in identifying personally relevant content (i.e. information delivery [2]). Such assistance could lower barriers for end-users to engage in a community, reduce information overload, and stimulate end-users to engage themselves in contributing new content.

## **4. A more than human culture of participation?**

This paper has briefly reviewed the role bots have (had) in Wikipedia, as a means to identify points of attention and directions for future research on the integration of AI-fueled systems into cultures of participation. The examples from Wikipedia highlighted in the previous section have shown that the relationship between human and non-human actors in a culture of participation is complicated and warrants careful thought.

The bot applications that were reviewed in this paper were mainly focused on managing end-user information needs. While Wikipedia has provided us with excellent examples of how bots could be integrated in cultures of participation, and what the consequences of such integration might be, we want to emphasize that many more scenarios for employing bots in cultures of participation exist.

One such scenario could be using bots to facilitate connections between end-users in cultures of participation. For example, linking end-users with relevant expertise in a patient support community [16]. Another example could be a bot mediating content in a discussion on such a platform, ensuring medical safety in relation to information exchanged between two non-expert peers. In both examples, the bot's role shifts from managing information resources towards managing and facilitating interaction between members of a culture of participation.

In this light, a key question that gathers increasing relevance as the capabilities of AI increase, is when autonomous bots should be regarded as 'equals' or as 'tools' to human actors in a culture of participation. Experiences from Wikipedia tell us that functional superiority should not be the driving argument behind integrating bots as equal partners in cultures of participation. In fact, such efforts might end up disrupting the social fabric of cultures of participation, reducing the engagement and value of the community for those involved.

Concluding, we believe that future research on the role of intelligent agents in cultures of participation should focus on contextually exploring the trade-offs between role, power and agency of such intelligent agents in cultures of participation, taking into account the fundamental aspect of end-user empowerment underlying EUD, meta-design and cultures of participation.

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