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reflection/viewpoint

Diversity, equity, and inclusion in e-government dialogue systems: Examining the research gap

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Abstract. In this viewpoint paper, we examine the limited attention given to diversity, equity, and inclusion (DEI) in research on dialogue systems for e-government. We first conduct an exploratory survey of Web of Science, Scopus, and the Digital Government Reference Library, identifying 178 publications on dialogue systems in e-government, of which only 10 focus on DEI issues. Our analysis of these publications reveals an emphasis on technical adaptations rather than on comprehensive frameworks for DEI-informed public service delivery. We then discuss why DEI is particularly critical in government contexts, given the diverse capabilities of citizens, the universal and mandatory nature of public services, and the role of dialogue systems in shaping administrative interactions. Finally, we outline research directions for integrating DEI principles into the design and evaluation of e-government dialogue systems, highlighting their role as socio-technical tools capable of promoting access and advancing public value in digital government.

Keywords. DEI, conversational agents, chatbots, electronic government, e-administration.
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1. Introduction

Dialogue systems —such as chatbots, virtual assistants, and other conversational agents— are increasingly being adopted by governments and public administrations as part of broader digital transformation initiatives (Senadheera et al., 2025). These systems, which enable interaction through spoken or written natural language, are aimed to provide government information, guide citizens through administrative procedures, and facilitate access to public services and open government data (Cortés-Cediel et al., 2023). Their growing deployment reflects a broader trend within the field of e-government toward the use of advanced digital technologies to improve service delivery, enhance administrative efficiency, and strengthen citizen engagement.

Recent advances in Artificial Intelligence (AI) —particularly the emergence of Large Language Models (LLMs) and the rapid proliferation of Generative AI (GenAI)— have expanded the capabilities of conversational interfaces (Yi et al., 2025). These technologies allow dialogue systems to interpret complex user queries and support more flexible, context-aware interactions. As a result, conversational technologies are becoming increasingly attractive tools for public sector organizations seeking scalable and user-friendly service channels.

At the same time, the principles of diversity, equity, and inclusion (DEI) have gained growing prominence in the design and evaluation of AI and dialogue systems (Abdelhalim et al., 2024; Shams et al., 2025). Across multiple domains, researchers and practitioners have emphasized the importance of ensuring that technological innovations do not exacerbate existing inequalities but instead contribute to more inclusive forms of access and participation. In fields such as Human–Computer Interaction (HCI), a substantial and growing body of research has examined how dialogue systems can be designed to accommodate diverse user populations (Himmelsbach et al., 2019), such as individuals with disabilities, users with different linguistic and cultural backgrounds, and people with varying levels of digital literacy.

Despite this growing attention in related disciplines —and even within parts of the e-government literature (Djatmiko et al., 2025)—, the integration of DEI considerations into dialogue systems for the public sector remains underexplored. This gap is particularly significant given the distinctive role of public services in citizens' lives. Unlike many private-sector digital services, access to public administration services is not merely optional (Organisation for Economic Co-operation and Development, 2020): citizens often depend on them to exercise rights, fulfill legal obligations, and obtain essential benefits. Consequently, the design of digital interaction channels in government contexts is closely linked to the creation and preservation of public value (Chen et al., 2024), which encompasses procedural and distributive justice in citizen-facing digital services.

The potential risks are especially pronounced for vulnerable or marginalized groups. Individuals with limited digital skills, cognitive limitations, disabilities, or language barriers may face substantial difficulties when interacting with automated systems that are not designed with inclusive principles in mind. Similarly, citizens who are unfamiliar with bureaucratic procedures, institutional terminology, or administrative processes may struggle to navigate conversational interfaces that implicitly assume such knowledge. When dialogue systems fail to account for differences in administrative literacy, they risk excluding or disadvantaging these uses.

More broadly, poorly designed digital interaction channels may inadvertently increase the administrative burden experienced by citizens, which encompasses the compliance, learning, and psychological costs they face when interacting with administrative procedures. While dialogue systems have the potential to reduce these burdens by simplifying interactions and guiding users through complex processes, they may also reproduce or amplify existing barriers if inclusiveness is not addressed in their design. Ensuring that conversational technologies in government contexts are comprehensible is not merely a matter of usability or user experience; it is closely connected to broader public sector responsibilities regarding universal access to public services.

Against this backdrop, the rapid expansion of conversational technologies in the public sector raises concerns that design decisions are currently being made without a sufficiently developed conceptual or empirical foundation regarding DEI principles. Although research communities in AI and HCI actively address issues such as fairness, bias, and inclusive interaction in dialogue systems, these insights appear to have only limited visibility within the e-government literature. This situation prompts important questions regarding knowledge transfer across research domains and the extent to which the specific characteristics of public sector contexts are considered in the design and evaluation of dialogue systems.

This viewpoint paper examines the research gap in the literature. Drawing on an exploratory survey based on comprehensive search queries conducted across major digital libraries —including Web of Science, Scopus, and DGRL— we analyze the extent to which DEI-related concerns are addressed in academic publications on dialogue systems in e-government. Our findings indicate that, despite a growing body of research on dialogue systems in public administration, explicit attention to DEI remains limited. Building on this observation, we discuss why the gap is particularly concerning in government contexts, where digital interaction channels must ensure equitable access to public services for all citizens and aim to reduce, rather than exacerbate, administrative burdens. Finally, we outline several research directions for integrating DEI perspectives into the design and evaluation of dialogue systems for the public sector, fostering stronger cross-fertilization between e-government research and fields such as AI and HCI.

2. Evidence of the research gap

To examine whether DEI aspects are considered in the literature on dialogue systems in the public sector, we conducted a survey of academic publications indexed in major digital libraries. The analysis was carried out in March 2026 and focused on three widely used sources for interdisciplinary research in information systems and digital government: Web of Science, Scopus, and the Digital Government Reference Library (DGRL). The publication search strategy consisted of two successive queries[1] designed to identify, first, the body of research on dialogue systems in e-government and, second, the subset of that literature that explicitly addresses DEI-related concerns.

The first query aimed to retrieve academic publications dealing with the analysis, design, or evaluation of dialogue systems in the context of e-government. The query was constructed using a logical AND combination of two sets of title keywords connected internally through OR operators. The first keyword set —shown in Table 1— captured terms related to dialogue systems and conversational technologies. The second title keyword set —shown in Table 2— targeted publications situated within the domain of government and public administration. By combining these two sets of keywords through a logical AND, the query retrieved publica-

[1] For DGRL, the formal queries were generated and executed on the library's BibTeX records using a computer program.

Table 1 – Dialogue systems-related keywords used in the literature search query.

Title keywords
dialogue system, dialogue agent, dialogue interface, dialogue user interface*, dialogue based system*, dialogue based agent*, dialogue based interface*, dialogue based user interface*, dialogue-based system*, dialogue-based agent*, dialogue-based interface*, dialogue-based user interface*, dialog system, dialog agent, dialog interface, dialog user interface*, dialog based system*, dialog based agent*, dialog based interface*, dialog based user interface*, dialog-based system*, dialog-based agent*, dialog-based interface*, dialog-based user interface*, conversational system*, conversational agent*, conversational interface*, conversational user interface*, conversational artificial intelligence, conversational AI*, virtual assistant*, intelligent assistant*, artificial intelligence assistant*, AI assistant*, chatbot*, chatterbot*

Table 2 – Government-related keywords used in the literature search query.

Title keywords
government*, administrati*, public service*, e-gov*, e-administration, citizen*, civic

tions that simultaneously referred to dialogue systems and to government or public administration contexts. Across the three digital libraries considered, this search returned 178 distinct publications (20% from 2006–2021, 22% from 2022–2023, and 58% from 2024–March 2026). These results provide an estimate of the size of the academic literature addressing dialogue systems within the e-government domain.

The second query was designed to assess the extent to which this body of research explicitly incorporates DEI considerations. To this end, the search strategy extended the first query by adding a third set of title keywords —shown in Table 3— related to DEI concepts. The final query therefore consisted of the logical AND combination of three title keyword sets: (1) dialogue systems and conversational technologies, (2) government and public administration, and (3) diversity, equity, and inclusion. Applying this more restrictive query to the same three digital libraries resulted in the retrieval of only 10 relevant publications. Compared with the 178 publications identified in the broader search, this result suggests that explicit consideration of DEI issues in e-government dialogue systems represents only a very small fraction (~5%) of the existing literature.

An examination of the 10 publications provides insight into how DEI aspects are considered in the e-government dialogue systems. Some contributions have framed conversational technologies as mechanisms for reducing **barriers faced by vulnerable populations**. Song (2022) argues that voice-based chatbots deployed in public services can strengthen information accessibility for socially vulnerable groups, thereby supporting digital inclusion and reinforcing citizens' ability to exercise fundamental rights. Sriwisathiyakun and Dhamanitayakul (2022) present a conversational agent designed to enhance digital literacy among senior citizens in Thailand through interactive learning modules and continuous availability. Their experimental results suggest that conversational agents can function not only as service delivery channels but also as educational tools supporting technology adoption among older users. Kurian et al. (2024) describe the GovInfohub chatbot, which integrates voice recognition and machine learning algorithms to provide real-time information about government programs. According to the authors, the system enables citizens to access public information more easily and encourages more active engagement with government services.

Other studies have focused on **linguistic diversity and literacy** in public service interactions. Sangeetha et al. (2025) propose a multilingual chatbot framework based on meta-learning and cross-lingual embeddings that significantly improves the performance of a e-government conversational agent for low-resource languages. Kusuma et al. (2024) introduce the Trisurya omnichannel chatbot, which combines retrieval-augmented generation and graph databases to support government information access in several local Indonesian languages, achieving higher accuracy than existing chatbot solutions. Crivellari and Rizk (2025) investigate how immigrants interact with generative AI conversational agents when seeking public administration information. Their study shows that digitally skilled immigrants perceive conversational agents as useful tools for overcoming administrative literacy gaps, particularly for translation and browsing tasks. At the same time, participants expressed concerns regarding reliability, accuracy, and privacy, indicating that perceived usefulness does not necessarily translate into high levels of trust.

Finally, **accessibility for individuals with disabilities** constitutes another important issue in the retrieved literature. Nedungadi et al. (2025) present a conversational agent capable of recognizing Indian Sign Language in real time using a vision transformer architecture. The authors argue that this capability can significantly

Table 3 – DEI-related keywords used in the literature search query.

Category	Title keywords
DEI and social justice principles	
Diversity, equity, and inclusion	DEI, diversity, equity, inequit*, inclusi*, exclusion
Justice	justice, unjustice, fair*, unfair*
Inequality	inequalit*, disparit*, divide*, gap*, bias*
Equity-seeking groups	
Minority groups	minorit*, underrepresent*, underserved
Vulnerable groups	vulnerab*, disadvantage*
Marginalized groups	marginaliz*, marginalis*, discriminat*, intersectionality
Language and literacy diversity	
Language background	linguistic, language adapt*, non native, non-native, language variet*, multilingual*
Literacy level	literac*, illiterac*
Accessibility and disabilities	
Access barriers	barrier*, accessib*, inaccessib*
Disabilities and impairments	disabilit*, disabled, impairment*, handicap*
Sensory disabilities	low vision, blind*, deaf*, deafblind*
Mental health and neurodiversity	mental health*, neurodivers*, disorder*, autis*, attention deficit*, ADD, ADHD, dyslexi*, dysgraphi*, dysprax*, DCD, dyscalculi*
Support needs and assistance	support need*, special need*, assistance*, assistive
Demographic, cultural, and socio-economic factors	
Age and life stage	age, child*, adolescent*, youth*, young person*, young people, elderly, old person*, old people, older adult*
Gender identity and expression	gender, transgender, nonbinary, non-binary, non binary, queer
Race, ethnicity, and cultural background	race, racial*, ethnic*, cultur*, multicultur*, multi-cultur*
National origin and migration status	origin*, nationalit*, foreign person*, foreign people, migrant*, immigrant*, emigrant*, refugee*, asylum seeker*
Socio-economic position	social class*, econom*, income*, low-income*, poverty, poor, precari*, unemploy*, homeless*

improve accessibility to public services for deaf and hard-of-hearing users in India. Ampatzidou et al. (2023) propose an accessible dialog system designed to provide personalized public service information through structured questionnaires and accessibility-oriented features. Their approach aims to reduce information asymmetries by adapting interactions to individual user needs. In contrast, Zapata and Díaz (2025) provide a critical empirical evaluation of municipal chatbots deployed in Spain, identifying substantial accessibility shortcomings for visually impaired users. Their analysis shows that many existing chatbot interfaces remain difficult to navigate for individuals with low or no vision, despite recent technological developments.

The examined publications also reveal different assumptions regarding the mechanisms through which conversational technologies may promote inclusion. Song (2022), Sriwisathiyakun and Dhamanitayakul (2022), and Kurian et al. (2024) adopt a perspective in which dialogue systems are presented as tools capable of empowering users by facilitating access to information and reducing barriers in interactions with government services. Lian et al. (2024) approach the issue from a technical perspective by proposing a contextualized government service chatbot based on relational graph convolutional networks and fuzzy logic. Their system introduces a re-questioning mechanism that improves question–answering performance for users with limited information literacy. Kusuma et al. (2024) and Sangeetha et al. (2025) similarly emphasize improvements in conversational system architectures as a means of improving accessibility, particularly through enhanced multilingual capabilities. Zapata and Díaz (2025), by contrast, focus on the evaluation of existing public sector implementations and highlight the persistence of accessibility barriers despite technological progress.

These studies also reveal important tensions. The optimistic assumption that conversational technologies automatically improve accessibility is challenged by the empirical findings reported by Zapata and Díaz (2025), which demonstrate that many municipal chatbot implementations still exhibit significant accessibility limitations. Differences in reported technical performance also illustrate the heterogeneity of current approaches. Nedungadi et al. (2025) report very high accuracy levels for sign language recognition in controlled experimental conditions, while Sangeetha et al. (2025) report more moderate performance improvements for multilingual chatbot architectures, suggesting that technological effectiveness may vary substantially depending on the task and implementation context. Finally, the user perception study by Crivellari and Rizk (2025) introduces an additional dimension that is largely absent from other contributions: the role of trust

and institutional legitimacy in shaping citizens' willingness to rely on AI-based conversational agents.

Overall, the analysis of the retrieved publications suggests that existing research addressing DEI concerns in dialogue systems for e-government remains fragmented and primarily technical in orientation. Individual studies examine specific accessibility features, linguistic capabilities, or particular user groups, but they rarely situate these efforts within broader discussions about equity in public service access or the social implications of automated government interactions. Consequently, while the identified studies provide valuable insights into potential technical solutions and user needs, they do not yet constitute a coherent body of research capable of systematically addressing DEI in the development of dialogue systems in the public sector.

3. Why DEI matters for dialogue systems in e-government

Unlike many digital services provided by private organizations, access to public services is often not optional. In commercial environments, conversational agents are typically used for customer service, product recommendations, or entertainment-related interactions. Although inclusiveness is also important in these contexts, users generally retain the option to switch to alternative providers or interaction channels if automated systems prove difficult to use. In the public sector, by contrast, citizens may have limited alternatives when accessing government services, particularly when digital channels are prioritized or when in-person services are reduced as part of digital transformation initiatives. In this context, there are several reasons why DEI considerations are particularly important for dialogue systems used by public administrations.

Because citizens rely on e-government platforms to obtain essential services, comply with legal obligations, and exercise fundamental rights, public digital services must serve **highly heterogeneous populations**. Public administrations interact with entire populations rather than specific market segments. As a result, dialogue systems must accommodate users with widely varying levels of accesibility needs, cognitive abilities, and digital literacy (Song, 2022; Sriwisathiyakun & Dhamanitayakul, 2022; Zapata & Díaz, 2025). Users may include older adults with limited digital skills, individuals with disabilities, and citizens living in rural areas with limited connectivity. Dialogue systems that are not designed with this diversity of user profiles in mind risk creating new forms of exclusion or reinforcing existing barriers to public service access.

Dialogue systems must also account for **linguistic diversity** (Kusuma et al., 2024; Sangeetha et al., 2025). They may perform optimally only in dominant languages or standard language varieties, potentially creating barriers for speakers of minority languages, regional dialects, or non-standard linguistic forms. Migrants, indigenous communities, and citizens with lower literacy levels may therefore experience difficulties in accessing public services or understanding critical information. Ensuring language inclusivity in conversational interfaces is essential for equitable access to e-government services and for supporting linguistic rights.

Conversational interfaces may also introduce particular barriers for users who are unfamiliar with administrative procedures and institutional terminology commonly used in public administration (Crivellari & Rizk, 2025). Citizens who lack what can be described as **administrative literacy** —that is, the ability to understand bureaucratic procedures, institutional requirements, and specialized administrative vocabulary— may find dialogue systems difficult to use if the interaction design implicitly assumes prior knowledge of bureaucratic processes. In such cases, the systems may unintentionally reproduce the complexity of administrative language instead of helping users navigate it.

Dialogue systems can also influence the level of **administrative burden** experienced by citizens when interacting with public institutions, referring to the learning, compliance, and psychological costs that individuals face when accessing public programs and services (Veiga et al., 2016). If conversational agents provide unclear instructions, require repeated clarification, or fail to adapt to different levels of user understanding, they may increase the cognitive and procedural effort required to complete administrative tasks.

Beyond usability concerns, dialogue systems deployed in government contexts also raise broader issues related to **algorithmic fairness, transparency, and accountability**. Design choices may influence how public information is communicated, how citizens interpret administrative requirements, and how they navigate bureaucratic procedures. Consequently, ensuring that dialogue systems interact with users in ways that are clear, accessible, and equitable becomes an important governance and public policy concern.

Finally, the design and deployment of public sector dialogue systems can affect **trust in institutions and legitimacy of government**. If automated systems appear biased, unresponsive, or difficult to use for certain groups, citizens may perceive public services as unfair or inaccessible, undermining confidence in governance structures. Ensuring that conversational interfaces are inclusive, transparent, and reliable is therefore essential for maintaining public trust and the perceived legitimacy of government institutions.

4. Research directions for DEI-based dialogue systems in e-government

The analysis presented in Section 2 reveals a gap between the rapid adoption of conversational technologies in the public sector and the limited attention to DEI in the e-government literature. Addressing this gap requires a **multidisciplinary research agenda** that integrates perspectives from HCI and AI (Abdelhalim et al., 2024; Shams et al., 2025) with those from e-government and public administration. Advancing DEI-oriented research would benefit from closer collaboration between these communities: HCI and AI scholars contribute expertise in inclusive design, accessibility, and bias mitigation, while e-government and public administration researchers provide knowledge of equity, citizen–state interactions, governance, and regulatory frameworks related to inclusion, such as social protection, universal accessibility, labor inclusion, and equality. Bridging these perspectives can foster more comprehensive approaches to dialogue system design that account for technical capabilities, user diversity, and institutional responsibilities in public service delivery. Given the complexity of DEI challenges in public-sector technologies, the agenda should also promote concrete mechanisms for cross-disciplinary integration, including co-design processes with public agencies and citizen groups, shared methodological frameworks that combine information systems and public policy perspectives, and collaboration models that connect technical and institutional expertise throughout the system lifecycle.

A key research direction involves developing specific **conceptual frameworks** that embed DEI considerations into the design of dialogue systems for government contexts. Existing models from responsible AI (Cachat-Rosset & Klarsfeld, 2023; Shams et al., 2025) have not been adapted to the complexities of public sector services. As discussed in Section 3, e-government dialogue systems must operate within diverse administrative environments and serve heterogeneous populations. Future work could focus on operationalizing DEI in conversational interfaces by considering not only factors such as gender identity and expression, cultural and socio-economic diversity, language proficiency, digital literacy, disabilities, and cognitive limitations, but also aspects such as familiarity with bureaucratic processes and administrative terminology.

User-centered research on how different populations interact with e-government dialogue systems represents another important avenue (Senadheera et al., 2025). Most existing studies emphasize technical performance, such as accuracy or efficiency, rather than the lived experiences of citizens using automated public services. A better understanding of inclusiveness requires examining how people with diverse backgrounds navigate conversational interfaces in practice. Future studies could explore interactions involving users with low digital literacy, non-native speakers, individuals with disabilities, or citizens unfamiliar with administrative terminology. Such research can reveal communication barriers, misunderstandings, or usability challenges that affect access to public services, thereby informing the design of more inclusive conversational interfaces.

Evaluation protocols for assessing DEI in public-sector dialogue systems require further refinement. Traditional metrics —such as response accuracy, latency, or task completion rates— primarily capture technical performance but provide limited insight into whether systems equitably serve diverse user populations (Radziwill & Benton, 2017). Future research should prioritize the development of systematic evaluation methodologies and metrics that address dimensions such as accessibility, language proficiency, administrative literacy, and the quality of user interactions across diverse citizen groups. By incorporating these considerations, public administrations can more effectively assess inclusiveness throughout the design, testing, and deployment phases, proactively identifying and mitigating barriers that may impede citizens' access to public services. Beyond technical and usability outcomes, evaluation frameworks should explicitly incorporate human values —including dignity, autonomy, fairness, administrative justice, and the reduction of administrative burden— and translate these into actionable design and assessment criteria. Embedding these value-oriented considerations into evaluation protocols would provide a more comprehensive understanding of how DEI-oriented dialogue systems contribute to improving citizens' quality of life, strengthening trust in public institutions, and promoting equitable access to public services and resources.

Finally, from a **technical perspective**, future research should also explore mechanisms that enhance accessibility, such as adaptive and multimodal interaction. Emerging conversational agents increasingly incorporate contextual memory or lightweight forms of user profiling that enable responses to be adapted based on previous interactions or known user characteristics. Additionally, rather than relying solely on text-based or voice responses, dialogue systems could integrate visual summaries, tables, guided forms, or interactive interface options (e.g., requesting simplified explanations).

5. Conclusions

Dialogue systems are rapidly becoming part of the digital infrastructure through which citizens interact with public administrations. They are increasingly used to provide public information, guide users through admin-

istrative procedures, and facilitate access to public services. At the same time, advances in AI —particularly, in LLMs and GenAI— are expanding the capabilities of conversational technologies and accelerating their adoption across government contexts. Despite these developments, the role of DEI in the design and evaluation of dialogue systems for e-government has received limited attention in the literature.

In this viewpoint paper, we examined this gap by exploring the extent to which DEI considerations are currently reflected in research on dialogue systems in digital government. An analysis of the academic literature suggests that existing contributions tend to focus on isolated technical solutions —such as voice and multilingual capabilities, accessibility features, or support for specific user groups— rather than developing broader conceptual frameworks for understanding inclusiveness in conversational public services.

The discussion presented in this paper highlights that dialogue systems in e-government operate within a set of institutional conditions that differ from those found in many other domains. Public administrations must address heterogeneous populations with varying levels of accessibility needs, cognitive abilities, digital literacy, and linguistic capabilities. In addition, government institutions are bound by legal and ethical obligations related to fairness, transparency, and equal treatment. Dialogue systems deployed in these contexts must therefore operate within the legal and procedural frameworks of public administration, ensuring that the automated guidance they provide is consistent with official regulations and administrative workflows. These characteristics introduce challenges that are not always captured in existing research on conversational technologies. Concepts such as administrative literacy, administrative burden, and public value provide useful lenses for understanding how automated conversational interfaces may shape citizens' interactions with government systems and why DEI principles should be treated as a central design concern.

Addressing these challenges requires closer engagement between the research communities studying conversational technologies and those examining digital government and public administration. Insights developed in fields such as HCI and responsible AI offer valuable foundations for designing more inclusive systems. However, these approaches must be adapted to account for the institutional realities of public sector service delivery, including regulatory constraints, organizational practices, and the social responsibilities associated with the provision of public services.

The research directions outlined point toward the need for a more integrated perspective that treats conversational technologies as socio-technical systems embedded within public sector institutions. By placing DEI at the center of the research agenda, scholars and practitioners can contribute to ensuring that the increasing use of dialogue systems supports equitable access to public services and strengthens the broader public value objectives of e-government. This also underscores the need to integrate governance and policy perspectives, and to offer clear pathways for operationalizing multidisciplinary DEI aspects.

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Use of AI

During the preparation of this work, the authors used ChatGPT in order to improve the readability of the manuscript. After using this tool, the authors reviewed, edited, made the content their own and validated the outcome as needed, and take full responsibility for the content of the publication.

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