

Investigating the Alignment of AI Evaluation Processes with Human-Centered Design Principles and National Security Imperatives

Kavya Venkatesh

Introduction

The intersection of national security imperatives and human-centered design (HCD) principles is critical for developing trustworthy artificial intelligence (AI) systems. The adoption of AI technologies in national security has accelerated, yet their alignment with HCD principles remains a significant challenge. Transparency, fairness, and trust in AI systems are necessary to ensure ethical and effective use, especially when these systems impact high-stakes decision-making.

This study aims to investigate how integrating HCD principles can improve the transparency, fairness, and ethical alignment of AI systems within the national security domain. By examining AI systems from both a technical and human-centered perspective, this research seeks to contribute to the development of more reliable and trustworthy AI solutions. Prior studies, such as those by Ozmen Garibay et al. (2023), have emphasized the need for such integration, but gaps remain in how these systems align with specific security and ethical considerations.

This thesis will explore these gaps by analyzing existing literature, reviewing AI systems currently in use, and applying thematic analysis to evaluate the alignment between HCD principles and national security requirements.

Literature Review

The integration of AI systems into national security presents both opportunities and challenges. Ahmad et al. (2020) discusses the importance of security, interpretability, and ethical challenges in the design of human-centered AI. AI systems are increasingly relied upon for decision-making in sensitive areas such as defense and surveillance, but their opacity can lead to mistrust among users and stakeholders. Schlicht et al. (2021) advocate for a transdisciplinary approach that incorporates user input and diverse stakeholder perspectives to design AI that is transparent and user-friendly.

Several studies emphasize the importance of aligning AI systems with HCD principles to ensure fairness, transparency, and ethical adherence. Transparency is particularly crucial in high-stakes environments wherein AI decisions impact national security. Ozmen Garibay et al. (2023) stress the need for trust in AI, which can be achieved through explainable AI systems that provide users with understandable decision-making processes.

In national security contexts, AI systems must also adhere to strict security and ethical standards. Yeung et al. (2020) discuss the necessity of responsible innovation in AI, particularly in how AI governance frameworks must be designed to respect human rights and security needs. Balancing the need for security with the principles of fairness and transparency remains a central challenge, and this study aims to address this by exploring how AI evaluation processes can align more closely with HCD principles.

Methodology

This research uses **thematic analysis** to investigate the alignment of AI evaluation processes with human-centered design principles and national security imperatives. This approach allows for the identification of recurring themes across a variety of documents, reports, and other relevant materials, focusing on how AI systems meet or fall short of HCD and national security standards.

Materials

The document repository includes technical reports, white papers, and scholarly articles sourced from databases like IEEE Xplore and Google Scholar. Search terms include “AI in national security,” “human-centered design in AI,” and “ethical AI systems.”

Data Collection

Documents will be systematically reviewed to identify how AI systems are evaluated for transparency, fairness, and ethical adherence. A specific focus will be on identifying how these systems align with or diverge from HCD principles such as user-centered design, interpretability, and ethical considerations.

Data Analysis

Using **thematic analysis**, the documents will be coded and analyzed to identify key themes related to the alignment of AI systems with HCD principles. The analysis will focus on transparency, ethical adherence, and security considerations within national security contexts. Themes will be categorized, and patterns will be drawn from the data to provide insights into how current AI systems align with these principles.

Results

Key Findings from Thematic Analysis of Human-Centered AI Research

1. Human-Centered Design Principles

- *User Involvement and Engagement:* Emphasis on involving users throughout the design and development processes to ensure that AI solutions meet their needs and preferences (e.g., user involvement in design, user engagement in tachAId).
- *Iterative Design and Evaluation:* Many studies advocate for iterative design processes to continuously refine AI systems based on user feedback (e.g., iterative development in healthcare AI, evaluation in tachAId).
- *Adaptability and Personalization:* Highlighting the importance of designing AI systems that can adapt to individual user contexts and preferences, leading to more personalized experiences (e.g., personalization in wellbeing technology and adaptable AI systems).

2. Ethical and Social Implications

- *Bias Detection and Mitigation:* Addressing biases in AI systems, particularly in sensitive areas like healthcare, and emphasizing the integration of ethical considerations throughout the design process (e.g., human-centered design to address biases, ethical AI).
- *Privacy and Security:* The need for robust security measures and privacy-preserving techniques to safeguard user data, especially in public and healthcare settings (e.g., smart city security, privacy in healthcare AI).
- *Transparency and Explainability:* Ensuring that AI systems are transparent and their decision-making processes are explainable to build user trust (e.g., explainability in AI systems, transparency in autonomous systems).

3. Interdisciplinary Collaboration

- *Collaborative Design Approaches:* Many studies emphasize the necessity of interdisciplinary collaboration among fields such as computer science, psychology, and design to develop AI systems that align with human values (e.g., interdisciplinary approaches in AGI and smart cities).
- *Stakeholder Involvement:* Engaging diverse stakeholders, including industry experts, policymakers, and users, in the design and governance of AI systems to ensure comprehensive and equitable solutions (e.g., stakeholder involvement in public procurement and human rights-centered design).

4. Implementation and Practical Application

- *Frameworks and Models*: The development of frameworks and models for effective human-centered AI implementation in various contexts, such as workplaces and smart cities, to ensure practical applicability and scalability (e.g., AI-based work systems and monitoring frameworks).
- *Conditions for Success*: Identifying factors that contribute to successful AI implementation, such as organizational culture, leadership support, and stakeholder collaboration (e.g., conditions for success in SMEs).

5. Future Directions and Challenges

- *Identifying Challenges*: Acknowledgment of existing challenges in human-centered AI design, including ethical dilemmas, data privacy concerns, and the complexity of integrating multiple technologies (e.g., challenges in autonomous systems and intelligent environments).
- *Vision for the Future*: Proposing future research directions and envisioning potential scenarios where human-centered AI technologies can enhance overall well-being, productivity, and user experience (e.g., future visions in intelligent environments).

The thematic analysis reveals a consistent focus on human-centered design principles, ethical implications, interdisciplinary collaboration, practical applications, and future challenges in the realm of AI research. These themes underscore the critical need for designing AI systems that are not only technically robust but also aligned with human values, fostering trust and promoting equitable outcomes across various applications. As the field evolves, addressing these themes will be vital in creating AI solutions that effectively support users while mitigating ethical and social risks.

Literature Review used for Thematic Analysis:

#	Citation	Title	Year	Annotations	Keywords
1	Ozmen Garibay, O., Winslow, B., Andolina, S., Antona, M., Bodenschatz, A., Coursaris, C., ... & Xu, W. (2023). Six human-centered artificial intelligence grand challenges. <i>International Journal of Human-Computer Interaction</i> , 39(3), 391-437.	Six human-centered artificial intelligence grand challenges	2023	<p>Transparency and Explainability: Improve AI transparency through interpretable models and visualization tools to help users understand AI decisions.</p> <p>Fairness and Bias Mitigation: Address biases in AI by implementing diverse data collection, bias detection, and correction algorithms.</p> <p>Privacy and Security: Ensure robust encryption, privacy-preserving techniques, and secure data handling, especially in national security contexts.</p> <p>Ethical and Social Implications: Develop ethical guidelines and frameworks involving interdisciplinary teams to</p>	<p>Transparency</p> <p>Explainability</p> <p>Fairness</p> <p>Bias Mitigation</p> <p>Privacy</p> <p>Security</p> <p>Ethics</p> <p>Human-AI Collaboration</p> <p>Regulatory Frameworks</p> <p>National Security</p>

				<p>assess and address social impacts of AI.</p> <p>Human-AI Collaboration: Design user-centered interfaces and interaction models to facilitate effective and intuitive human-AI collaboration.</p>	
2	<p>Margetis, G., Ntoa, S., Antona, M., & Stephanidis, C. (2021). Human-centered design of artificial intelligence. Handbook of human factors and ergonomics, 1085-1106.</p>	<p>Human-centered design of artificial intelligence</p>	2021	<p>User Involvement in Design: Engage users throughout the AI design process to ensure the system meets their needs and preferences, enhancing usability and acceptance.</p> <p>Interdisciplinary Collaboration: Foster collaboration among diverse fields such as psychology, design, and computer science to create AI systems that are both technically robust and user-friendly.</p> <p>Iterative Design and Evaluation: Implement an iterative process of designing, testing, and refining AI systems to continually improve functionality and user satisfaction.</p> <p>Ethical Considerations: Integrate ethical principles into the AI design process to address issues like bias, privacy, and fairness, ensuring AI systems act in socially responsible ways.</p> <p>Adaptability and Personalization: Design AI systems that can adapt to individual user preferences and contexts, providing personalized experiences and support.</p>	<p>User Involvement</p> <p>Interdisciplinary Collaboration</p> <p>Iterative Design</p> <p>Ethical Principles</p> <p>Adaptability</p> <p>Personalization</p> <p>Usability</p> <p>Human-Centered AI</p>

3	<p>Bauroth, M., Rath-Manakidis, P., Langhof, V., Wiskott, L., & Glasmachers, T. (2024). tachAId—An interactive tool supporting the design of human-centered AI solutions. <i>Frontiers in Artificial Intelligence</i>, 7, 1354114.</p>	<p>tachAId—An interactive tool supporting the design of human-centered AI solutions</p>	2024	<p>Interactive Design Tool: The paper presents tachAId, a tool designed to support the creation of human-centered AI solutions by providing interactive design capabilities. User Engagement: Emphasizes the importance of involving users in the AI design process to ensure the resulting solutions are intuitive and meet user needs. Design and Evaluation Support: tachAId facilitates the iterative process of designing, prototyping, and evaluating AI systems, enhancing the alignment with human-centered design principles. Customization and Adaptability: The tool allows for customization and adaptation to different user requirements and contexts, ensuring personalized AI solutions. Integration with Development Workflows: Supports seamless integration with existing development workflows, enabling efficient and user-centered AI design practices.</p>	<p>Interactive Design Tool User Engagement Iterative Design Customization Adaptability Human-Centered AI Prototyping Evaluation</p>
4	<p>Chen, Y., Clayton, E. W., Novak, L. L., Anders, S., & Malin, B. (2023). Human-centered design to address biases in artificial intelligence.</p>	<p>Human-centered design to address biases in artificial intelligence</p>	2023	<p>Bias Detection and Mitigation: Focuses on identifying and addressing biases in AI systems, particularly in the context of healthcare. Human-Centered Design: Utilizes human-centered design principles to develop AI systems that are equitable, transparent, and fair.</p>	<p>Bias Detection Bias Mitigation Human-Centered Design Stakeholder Engagement Iterative Development Ethical AI Transparency Fairness</p>

	Journal of medical Internet research, 25, e43251.			<p>Stakeholder Engagement: Involves a diverse range of stakeholders, including patients, healthcare providers, and technologists, to ensure the AI systems meet the needs of all users.</p> <p>Iterative Development: Advocates for an iterative development process to continuously refine AI systems based on user feedback and performance evaluation.</p> <p>Ethical Considerations: Emphasizes the integration of ethical considerations throughout the design and implementation of AI systems to promote trust and acceptance.</p>	
5	Yue, Y., & Shyu, J. Z. (2023). An overview of research on human-centered design in the development of artificial general intelligence. arXiv preprint arXiv:2309.12352.	An overview of research on human-centered design in the development of artificial general intelligence	2023	<p>Human-Centered Design in AGI: Provides an overview of how human-centered design principles are being integrated into the development of artificial general intelligence (AGI).</p> <p>Interdisciplinary Approach: Highlights the importance of interdisciplinary collaboration among fields such as cognitive science, psychology, and computer science to create AGI that aligns with human values and needs.</p> <p>Ethics and Safety: Discusses the ethical implications and safety considerations in AGI development, emphasizing the need for responsible innovation.</p> <p>User-Centric Development: Advocates for involving end-users throughout the AGI development process to ensure that the</p>	<p>Human-Centered Design</p> <p>Artificial General Intelligence (AGI)</p> <p>Interdisciplinary Collaboration</p> <p>Ethics</p> <p>Safety</p> <p>User-Centric Development</p> <p>Challenges</p> <p>Future Directions</p>

				<p>technology is user-friendly and addresses real-world needs.</p> <p>Challenges and Future Directions: Identifies key challenges in aligning AGI development with human-centered design, such as scalability and complexity, and suggests future research directions.</p>	
6	<p>Schoenherr, J. R., Abbas, R., Michael, K., Rivas, P., & Anderson, T. D. (2023). Designing AI using a human-centered approach: Explainability and accuracy toward trustworthines s. IEEE Transactions on Technology and Society, 4(1), 9-23.</p>	<p>Designing AI using a human-centered approach: Explainability and accuracy toward trustworthines s</p>	2023	<p>Explainability and Transparency: Emphasizes the importance of designing AI systems with high levels of explainability and transparency to build user trust.</p> <p>Balancing Accuracy and Explainability: Discusses the trade-off between achieving high accuracy in AI models and ensuring that these models are explainable to users.</p> <p>User Trust: Highlights that trustworthiness in AI systems is crucial and can be achieved by ensuring that users understand how AI decisions are made.</p> <p>Human-Centered Design Principles: Advocates for the integration of human-centered design principles throughout the AI development process to ensure the systems are user-friendly and meet user needs.</p> <p>Evaluation and Iteration: Encourages continuous evaluation and iterative improvement of AI systems based on user feedback to maintain</p>	<p>Explainability Transparency Accuracy User Trust Human-Centered Design Trustworthines s Iterative Improvement User Feedback</p>

				accuracy and trustworthiness.	
7	<p>He, H., Gray, J., Cangelosi, A., Meng, Q., McGinnity, T. M., & Mehnen, J. (2021). The challenges and opportunities of human-centered AI for trustworthy robots and autonomous systems. <i>IEEE Transactions on Cognitive and Developmental Systems</i>, 14(4), 1398-1412.</p>	<p>The challenges and opportunities of human-centered AI for trustworthy robots and autonomous systems</p>	2021	<p>Trustworthiness in Autonomous Systems: Discusses the challenges and opportunities in developing trustworthy robots and autonomous systems through human-centered AI.</p> <p>Human-Robot Interaction: Emphasizes the importance of designing systems that facilitate effective and intuitive human-robot interaction to build trust and usability.</p> <p>Ethics and Safety: Highlights the need for integrating ethical considerations and ensuring safety in the development of autonomous systems.</p> <p>Transparency and Explainability: Stresses the need for transparency and explainability in AI decisions to enhance user understanding and trust.</p> <p>Adaptive and Personalized Systems: Advocates for the creation of adaptive and personalized autonomous systems that can cater to individual user needs and contexts.</p>	<p>Trustworthiness</p> <p>Autonomous Systems</p> <p>Human-Robot Interaction</p> <p>Ethics</p> <p>Safety</p> <p>Transparency</p> <p>Explainability</p> <p>Adaptive Systems</p> <p>Personalization</p>

8	<p>Ahmad, K., Maabreh, M., Ghaly, M., Khan, K., Qadir, J., & Al-Fuqaha, A. (2020). Developing future human-centered smart cities: Critical analysis of smart city security, interpretability, and ethical challenges. arXiv preprint arXiv:2012.09110.</p>	<p>Developing future human-centered smart cities: Critical analysis of smart city security, interpretability, and ethical challenges</p>	2020	<p>Smart City Security: Analyzes the security challenges in developing human-centered smart cities, emphasizing the need for robust security measures to protect citizen data and infrastructure. Interpretability: Discusses the importance of interpretability in smart city AI systems to ensure that decisions made by these systems are understandable to citizens and stakeholders. Ethical Challenges: Highlights the ethical issues in smart city development, such as privacy concerns, data governance, and the potential for biased decision-making. Human-Centered Design: Advocates for integrating human-centered design principles to create smart city technologies that prioritize the needs and values of the residents. Critical Analysis and Solutions: Provides a critical analysis of current smart city initiatives and proposes solutions to address the identified security, interpretability, and ethical challenges.</p>	<p>Smart City Security Interpretability Ethical Challenges Human-Centered Design Privacy Data Governance Bias Citizen-Centric Solutions</p>
---	--	--	------	--	---

9	Naudé, W., & Dimitri, N. (2021). Public Procurement and Innovation for Human-Centered Artificial Intelligence.	Public Procurement and Innovation for Human-Centered Artificial Intelligence.	2021	<p>Public Procurement as a Driver for Innovation: Explores how public procurement can be leveraged to promote innovation in human-centered AI, ensuring that AI solutions align with public values and needs.</p> <p>Policy Frameworks: Discusses the importance of developing and implementing policy frameworks that support the procurement of AI technologies focused on human-centered design.</p> <p>Ethical and Responsible AI: Emphasizes the need for ethical and responsible AI in public procurement, ensuring that AI systems are transparent, fair, and accountable.</p> <p>Stakeholder Involvement: Highlights the role of involving various stakeholders, including policymakers, industry, and the public, to ensure that AI procurement processes meet societal expectations and ethical standards.</p> <p>Barriers and Solutions: Identifies barriers to the effective procurement of human-centered AI, such as lack of expertise and regulatory challenges, and proposes solutions to overcome these obstacles.</p>	<p>Public Procurement Innovation Human-Centered AI Policy Frameworks Ethical AI Responsible AI Stakeholder Involvement Barriers Solutions</p>
---	--	---	------	---	---

10	<p>Torkamaan, H., Tahaei, M., Buijsman, S., Xiao, Z., Wilkinson, D., & Knijnenburg, B. P. (2024). The Role of Human-Centered AI in User Modeling, Adaptation, and Personalization—Models, Frameworks, and Paradigms. In <i>A Human-Centered Perspective of Intelligent Personalized Environments and Systems</i> (pp. 43-83). Cham: Springer Nature Switzerland.</p>	<p>The Role of Human-Centered AI in User Modeling, Adaptation, and Personalization—Models, Frameworks, and Paradigms</p>	2024	<p>Focus on Human-Centered AI: Explores how human-centered AI enhances user modeling, adaptation, and personalization in intelligent personalized environments and systems. Models and Frameworks: Discusses various models, frameworks, and paradigms employed in human-centered AI to understand user preferences, behavior, and needs. Adaptation and Personalization: Highlights the role of AI in dynamically adapting systems and content to individual users, enhancing user experience and engagement. Ethical Considerations: Addresses ethical considerations in user modeling and personalization, including privacy, fairness, and transparency in AI decision-making. Contributions to A Human-Centered Perspective: Contributes to a broader understanding of how AI can be used to create personalized environments and systems that prioritize user needs and preferences.</p>	<p>Human-Centered AI User Modeling Adaptation Personalization Models Frameworks Paradigms Ethical Considerations Intelligent Personalized Environments Systems</p>
----	--	--	------	--	--

1 1	<p>Schlicht, L., Melzer, M., Rösler, U., Voß, S., & Vock, S. (2021, November). An integrative and transdisciplinary approach for a human-centered design of AI-based work systems. In ASME International Mechanical Engineering Congress and Exposition (Vol. 85697, p. V013T14A048). American Society of Mechanical Engineers.</p>	<p>An integrative and transdisciplinary approach for a human-centered design of AI-based work systems</p>	2021	<p>Integrative and Transdisciplinary Approach: Presents an approach for designing AI-based work systems that integrates insights from multiple disciplines and involves stakeholders from various backgrounds.</p> <p>Human-Centered Design: Emphasizes the importance of placing human needs, capabilities, and preferences at the center of AI-based work system design.</p> <p>Practical Application: Discusses how the approach can be applied in the design and development of AI systems for different industrial and organizational settings.</p> <p>Collaborative Stakeholder Involvement: Advocates for involving diverse stakeholders, including workers, managers, engineers, and designers, in the design process to ensure that AI systems meet the needs of all users.</p> <p>Outcomes and Impact: Explores the potential outcomes and impact of adopting an integrative and transdisciplinary approach to human-centered design of AI-based work systems.</p>	<p>Integrative Approach Transdisciplinary Approach Human-Centered Design AI-based Work Systems Stakeholder Involvement Industrial Settings Organizational Settings Collaborative Design</p>
--------	---	---	------	---	---

<p>1 2</p>	<p>Yeung, K., Howes, A., & Pogrebna, G. (2020). Ai governance by human rights–centered design, deliberation, and oversight. The Oxford handbook of ethics of AI, 77-106.</p>	<p>Ai governance by human rights–centered design, deliberation, and oversight</p>	<p>2020</p>	<p>AI Governance: Explores the governance of AI systems through a human rights-centered approach, focusing on design, deliberation, and oversight mechanisms. Human Rights-Centered Design: Advocates for designing AI systems that prioritize and uphold fundamental human rights principles, such as privacy, non-discrimination, and freedom of expression. Deliberative Processes: Discusses the importance of incorporating deliberative processes into AI governance, allowing for diverse stakeholder perspectives to be considered in decision-making. Oversight Mechanisms: Examines various oversight mechanisms, such as regulatory frameworks, auditing processes, and ethical review boards, to ensure accountability and compliance with human rights standards. Ethical Considerations: Addresses ethical considerations in AI governance, including the need for transparency, fairness, and accountability in the development and deployment of AI systems.</p>	<p>AI Governance Human Rights-Centered Design Deliberation Oversight Ethical Considerations Regulatory Frameworks Accountability Transparency</p>
----------------	--	---	-------------	--	---

1 3	<p>Tahvanainen, L., Tetri, B., & Ahonen, O. (2024, May). Exploring and Extending Human-Centered Design to Develop AI-Enabled Wellbeing Technology in Healthcare. In Nordic Conference on Digital Health and Wireless Solutions (pp. 288-306). Cham: Springer Nature Switzerland.</p>	<p>Exploring and Extending Human-Centered Design to Develop AI-Enabled Wellbeing Technology in Healthcare</p>	2024	<p>Application in Healthcare: Explores the adaptation of human-centered design principles to the development of AI-enabled wellbeing technology in healthcare settings.</p> <p>Focus on Wellbeing: Emphasizes the importance of leveraging AI to enhance wellbeing outcomes in healthcare, addressing both physical and mental health needs.</p> <p>User-Centered Approach: Advocates for a user-centered approach that considers the perspectives and experiences of healthcare users, including patients, caregivers, and healthcare professionals.</p> <p>Integration of AI: Discusses how AI technologies can be integrated into wellbeing technology to personalize interventions, optimize treatment plans, and improve patient outcomes.</p> <p>Practical Application: Provides insights into the practical application of human-centered design principles and AI-enabled technology in healthcare settings, including challenges and opportunities.</p>	<p>Human-Centered Design AI-Enabled Wellbeing Technology Healthcare User-Centered Approach Personalization Mental Health Practical Application</p>
--------	--	---	------	--	--

<p>1 4</p>	<p>Clayton, E. W., Chen, Y., Novak, L. L., Anders, S., & Malin, B. (2023). Human-Centered Design to Address Biases in Artificial Intelligence. <i>Journal of Medical Internet Research</i>, doi-10.</p>	<p>Human-Centered Design to Address Biases in Artificial Intelligence</p>	<p>2023</p>	<p>Focus on Bias Mitigation: Discusses the application of human-centered design principles to address biases in artificial intelligence (AI) systems, particularly in healthcare contexts. User Involvement: Emphasizes the importance of involving diverse stakeholders, including patients, healthcare providers, and AI developers, in the design process to identify and mitigate biases effectively. Ethical Considerations: Addresses ethical implications associated with biased AI algorithms, such as disparities in healthcare outcomes and potential harm to vulnerable populations. Transparency and Accountability: Advocates for transparency and accountability in AI development and deployment to ensure that biases are identified, addressed, and monitored over time. Impact on Healthcare: Discusses the potential impact of biased AI on healthcare quality, patient trust, and equitable access to healthcare services.</p>	<p>Human-Centered Design Bias Mitigation Artificial Intelligence Healthcare User Involvement Ethical Considerations Transparency Accountability</p>
----------------	---	---	-------------	---	---

1 5	Ystgaard, K. F., & De Moor, K. (2023). Envisioning the future: a multi-disciplinary approach to human-centered intelligent environments. <i>Quality and User Experience</i> , 8(1), 11.	Envisioning the future: a multi-disciplinary approach to human-centered intelligent environments	2023	<p>Interdisciplinary Approach: Discusses a multi-disciplinary approach to envisioning the future of human-centered intelligent environments, emphasizing collaboration across various fields.</p> <p>Human-Centered Design: Highlights the importance of placing human needs, preferences, and experiences at the forefront of designing intelligent environments.</p> <p>Quality and User Experience: Explores how quality and user experience play essential roles in shaping the design and adoption of intelligent environments.</p> <p>Future Vision: Envisions potential future scenarios where intelligent environments seamlessly integrate with human activities, enhancing productivity, comfort, and overall well-being.</p> <p>Challenges and Opportunities: Addresses challenges and opportunities associated with the development and implementation of human-centered intelligent environments, such as privacy concerns and technological advancements.</p>	<p>Interdisciplinary Approach</p> <p>Human-Centered Design</p> <p>Intelligent Environments</p> <p>Quality</p> <p>User Experience</p> <p>Future Vision</p> <p>Challenges</p> <p>Opportunities</p>
--------	---	--	------	--	--

1 6	Régis, C., Denis, J. L., Axente, M. L., & Kishimoto, A. (2024). Human-centered AI: A Multidisciplinary Perspective for Policy-makers, Auditors, and Users (p. 359). Taylor & Francis.	Human-centered AI: A Multidisciplinary Perspective for Policy-makers, Auditors, and Users	2024	<p>Human-Centered AI: Explores the concept of human-centered AI from a multidisciplinary perspective, addressing its implications for policy-makers, auditors, and users.</p> <p>Interdisciplinary Collaboration: Advocates for collaboration across various disciplines to ensure that AI technologies prioritize human values, ethics, and well-being.</p> <p>Policy-Making: Discusses the role of policy-makers in shaping regulations and guidelines that promote the development and deployment of human-centered AI systems.</p> <p>Auditor Oversight: Highlights the importance of auditor oversight in ensuring compliance with ethical standards, transparency, and accountability in AI implementation.</p> <p>User Engagement: Emphasizes the need for involving users in the design and evaluation of AI systems to ensure that they meet user needs and preferences.</p>	Human-Centered AI Multidisciplinary Perspective Policy-Makers Auditors Users Interdisciplinary Collaboration Policy-Making Auditor Oversight User Engagement
1 7	Böhme, C., Graf-Pfohl, C., & Meusinger, K. (2024). Human Centered Implementation Process of AI in SMEs—Conditions for Success. In First Working	Human Centered Implementation Process of AI in SMEs—Conditions for Success	2024	<p>Human-Centered Implementation Process: Explores the implementation process of AI in small and medium-sized enterprises (SMEs) with a focus on human-centered approaches.</p> <p>Conditions for Success: Discusses the factors that contribute to the successful integration of AI technologies in SMEs,</p>	Human-Centered Implementation Process AI SMEs Conditions for Success Resilience Sustainability Challenges Opportunities

	Conference on Artificial Intelligence Development for a Resilient and Sustainable Tomorrow (p. 83).			such as organizational culture, leadership support, and employee training. Resilience and Sustainability: Considers the role of AI in fostering resilience and sustainability in SMEs, potentially improving efficiency, reducing costs, and enhancing competitiveness. Challenges and Opportunities: Addresses the challenges and opportunities associated with AI adoption in SMEs, including resource constraints, data privacy concerns, and potential benefits for innovation and growth.	
1 8	Valdez, A. C., Heine, M., Franke, T., Jochems, N., Jetter, H. C., & Schrills, T. (2024). The European Commitment to Human-Centered Technology: The Integral Role of HCI in the EU AI Act's Success. arXiv preprint arXiv:2402.14728.	The European Commitment to Human-Centered Technology: The Integral Role of HCI in the EU AI Act's Success	2024	European Commitment to Human-Centered Technology: Explores the European Union's dedication to promoting technology that prioritizes human values and well-being. Integral Role of HCI: Discusses how Human-Computer Interaction (HCI) principles and practices are essential for ensuring the success of the EU AI Act. Regulatory Framework: Examines the EU AI Act as a regulatory framework designed to govern the development and deployment of AI technologies in alignment with human-centered principles. HCI's Contribution: Highlights HCI's contribution to the implementation of the EU	European Union Human-Centered Technology HCI EU AI Act Regulatory Framework User-Centric Design Ethical AI Transparency

				AI Act by facilitating user-centric design, ethical AI development, and transparency in AI systems. Implications and Future Directions: Considers the implications of integrating HCI into AI regulation and outlines potential future directions for research and policy development in this area.	
19	Tigges, M., Ipert, C., & Mauer, R. (2022, June). Leveraging Design Thinking Towards the Convergence of AI, IoT and Blockchain: Strategic Drivers and Human-Centered Use Cases. In International Conference on Human-Computer Interaction (pp. 147-162). Cham: Springer International Publishing.	Leveraging Design Thinking Towards the Convergence of AI, IoT and Blockchain: Strategic Drivers and Human-Centered Use Cases	2022	Leveraging Design Thinking: Explores the application of design thinking principles to facilitate the convergence of Artificial Intelligence (AI), Internet of Things (IoT), and Blockchain technologies. Strategic Drivers: Identifies strategic drivers that motivate the integration of AI, IoT, and Blockchain, such as enhancing efficiency, security, and transparency in various domains. Human-Centered Use Cases: Presents human-centered use cases where the convergence of AI, IoT, and Blockchain technologies can positively impact user experiences and outcomes. International Conference Presentation: Discusses findings and insights from the study presented at the International Conference on Human-Computer Interaction. Potential Implications: Considers the potential implications of leveraging design thinking for the convergence of AI, IoT, and Blockchain, including	Design Thinking AI IoT Blockchain Strategic Drivers Human-Centered Use Cases International Conference Innovation Value Creation

				improved innovation and value creation.	
20	Charter, T. (2024). Human-Centered Intelligent Monitoring and Control of Industrial Systems: A Framework for Immersive Cyber-Physical Systems.	Human-Centered Intelligent Monitoring and Control of Industrial Systems: A Framework for Immersive Cyber-Physical Systems.	2024	<p>Human-Centered Intelligent Monitoring and Control: Introduces a framework for the development of immersive cyber-physical systems focused on human-centered intelligent monitoring and control of industrial systems.</p> <p>Immersive Technology Integration: Discusses the integration of immersive technologies such as virtual reality (VR) and augmented reality (AR) to enhance the monitoring and control of industrial processes.</p> <p>Human-Centered Design: Emphasizes the importance of human-centered design principles in creating systems that are intuitive, efficient, and supportive of human operators.</p> <p>Framework Overview: Outlines the key components and principles of the framework, including sensor integration, data visualization, real-time analytics, and user interface design.</p> <p>Applications in Industrial Settings: Explores potential applications of the</p>	Human-Centered Intelligent Monitoring Control Industrial Systems Framework Immersive Technology Cyber-Physical Systems Virtual Reality Augmented Reality

				framework in industrial settings, aiming to improve safety, efficiency, and productivity.	
--	--	--	--	---	--

Discussion

The findings highlight significant misalignments between current AI evaluation processes and HCD principles. Transparency, while acknowledged as crucial, is often deprioritized in favor of technical performance metrics. Similarly, user-centered design is inconsistently applied, creating usability challenges in critical scenarios.

To address these gaps, this study recommends:

1. *Mandatory Explainability Standards*: Implementing minimum transparency requirements for all AI systems in national security.
2. *Ethical Audits*: Regular evaluations of AI systems to ensure alignment with fairness and ethical guidelines.
3. *Interdisciplinary Collaboration*: Involving diverse stakeholders, including policymakers and end-users, throughout the AI development lifecycle.

These measures can improve trust, accountability, and usability, fostering the adoption of responsible AI technologies in national security.

Conclusion

This research seeks to address the challenges of aligning AI evaluation processes with human-centered design principles and national security requirements. By conducting a thematic analysis of relevant documents and reports, the study will provide insights into how AI systems can be better aligned with these principles, ensuring more transparent, fair, and ethical AI systems in the future.

References (in addition to Literature Review)

1. Ozmen Garibay, O., Winslow, B., Andolina, S., et al. (2023). Six human-centered artificial intelligence grand challenges. *International Journal of Human-Computer Interaction*, 39(3), 391-437.
2. Ahmad, K., Maabreh, M., Ghaly, M., et al. (2020). Developing future human-centered smart cities: Critical analysis of smart city security, interpretability, and ethical challenges. *arXiv preprint arXiv:2012.09110*.
3. Schlicht, L., Melzer, M., Rösler, U., et al. (2021). An integrative and transdisciplinary approach for a human-centered design of AI-based work systems. *ASME International Mechanical Engineering Congress and Exposition*, 85697, V013T14A048.
4. Yeung, K., Howes, A., & Pogrebná, G. (2020). AI governance by human rights-centered design, deliberation, and oversight. *The Oxford handbook of ethics of AI*, 77-106.