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ORIGINAL ARTICLE

Digital humanism in requirements engineering for healthcare solutions in the age of AI

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Abstract
This research commentary explores how requirements engineering (RE) can contribute to achieving digital humanism in AI-enabled healthcare, ensuring that technological innovation is balanced with human values. Drawing on insights from a panel discussion at the REWBAH'25 (RE for Well-Being, Aging, and Health) workshop, we identify four key themes: the necessity of interdisciplinary collaboration, the nuances of cultural and individual differences, human-AI collaborative decision-making, and the challenge of balancing technological advancement with sustainability and emotional considerations. We argue that RE is well suited for addressing these issues because it brings together diverse stakeholder perspectives to define what systems should achieve and how they should be used. In this paper, we build on digital humanism principles, on RE-relevant frameworks for AI, and on the above themes to frame the role of RE in supporting human-centred healthcare. We highlight open challenges, and outline five promising research directions and related research questions to guide future research and practice in RE, aiming to ensure that AI-enabled healthcare systems better reflect the values of digital humanism.

Keywords Requirements engineering · Digital humanism · Digital health · Human-AI collaboration · Human values

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1 Introduction

Healthcare systems are undergoing rapid transformation, driven by demographic shifts, rising health risks, and the opportunities offered by digital technologies [1]. At the same time, the accelerating adoption of artificial intelligence (AI) is influencing how healthcare services are designed, delivered, and governed. Increasingly, digital health systems are not limited to supporting clinical care but also aim to promote well-being, encourage healthy lifestyles, and respond to the needs of aging populations [2]. Recent crises have exposed the fragility of healthcare systems and heightened the ethical and societal stakes of digital transformation. The COVID-19 pandemic, geopolitical conflicts, energy insecurity, inflation, privacy issues, and climate-related extreme events have disrupted care delivery and governance while exacerbating health inequalities. At the same time, population ageing, chronic diseases, and accelerating digitalisation using AI place sustained pressure on health systems.

In this context, Requirements Engineering (RE) plays a critical role in shaping digital health solutions, as it provides the methods and practices for eliciting, analysing, and validating the needs that software systems must address [3]. This creates both challenges and opportunities for the RE community: how can we design and build healthcare systems with AI that are not only technically sound but also ethically grounded, socially inclusive, and supportive of long-term human values? While ethical and human-centred AI principles have been widely discussed, there is still limited understanding of how these principles can be systematically operationalised within RE practices for AI-enabled healthcare systems.

The REWBAH (Requirements Engineering for Well-Being, Aging, and Health) workshop was established to explore such questions. It brings together researchers and practitioners from RE, healthcare, and related disciplines to examine how digital systems can support health, well-being, and quality of life. The workshop builds on the idea that technology should not only deliver healthcare services but also encourage healthier lifestyles, help people manage long-term conditions, and respond to the needs of an aging population. For example, the workshop fosters investigations into how healthcare applications can be more inclusive by providing tailored support, such as personalized programs that help reduce health risks and promote well-being.

Digital humanism has emerged as a response to growing concerns about the societal impacts of digital technologies, including issues of inequality, power asymmetries, and the need to safeguard human dignity in the digital age [4, 5]. It emphasizes that digital technologies are not inevitable forces, but socio-technical systems that can and should be shaped according to human values. Recent research policy, such as by the European Commission [6], further reinforces the relevance of digital humanism in healthcare. Within Horizon Europe, health is framed as a systemic, human-centred societal challenge, explicitly linking digital transformation to ethics, inclusion, trust, resilience, and environmental sustainability [6]. However, the implications of digital humanism for RE in AI-enabled healthcare remain underexplored, particularly in terms of how RE methods can translate humanistic values into system requirements and specifications.

This paper is a research commentary that synthesizes insights from related work and the REWBAH'25 panel discussion to propose a research agenda for digital humanism in RE for AI-enabled healthcare solutions. We first introduce digital humanism, then examine humanistic RE and AI frameworks, specifically RE4HCAI [7] and FUTURE-AI [8], before presenting the REWBAH'25 panel insights and a research agenda that outlines promising directions for future research and practice at the intersection of digital humanism, RE, and AI-enabled healthcare systems.

2 Digital humanism

Digital humanism emerged from an international workshop in Vienna in 2019, resulting in the Vienna Manifesto on digital humanism [9], which was inspired by the tradition of the Vienna Circle, a historic multidisciplinary effort to reflect on the revolutionary implications of science. In the context of digital systems development, these reflections raise important questions for RE, particularly regarding how human values, societal considerations, and ethics can be translated into system requirements. Digital humanism is a call to action for scientists, policymakers, and citizens to actively shape technology according to human values and needs, rather than passively accepting its trajectory as inevitable. The Vienna Manifesto [9] outlines several core areas for action, which can be summarized as follows [5]:

- **Privacy**, **democracy**, **and inclusion**: Demands that digital technologies be designed to promote democratic values, with privacy and freedom of speech as central considerations.
- **Regulation and public oversight**: Calls for regulatory intervention to break up technology monopolies and insists that decisions affecting human rights must ultimately be made by humans.
- **The specific role of science and the academic sector**: Emphasizes the crucial role of interdisciplinary research and critical thinking nurtured in universities to master technological challenges holistically.

- **Education and training**: Advocates for new curricula that integrate technical sciences with humanities and social sciences, starting digital and ethical literacy as early as possible.

Prem [4] synthesized the movement's core philosophy into five overarching principles that capture the essence of digital humanism:

1. **Digital technologies are changing us and our lives.** This principle acknowledges the profound and co-evolutionary impact of technology on society and individuals. It critically questions the dominant narrative that all digital innovation equates to societal progress, reminding us that these technologies also enable unprecedented intrusions into privacy and can threaten fundamental rights.
2. **Digital technology must protect people and the environment.** This central tenet places human dignity, freedom, and autonomy at the forefront. It also moves beyond a purely anthropocentric view by explicitly extending its concern to the environmental sustainability of digital systems, calling for technology that keeps our environment liveable.
3. **Digital technology should strengthen democracy and society.** It demands that technology be developed and implemented to serve democracy, promote justice and freedom, and enable social welfare and solidarity. This stands in direct opposition to the current reality where digital platforms are often blamed for enabling threats to liberal democracies.
4. **The use and application of digital technology can be shaped.** This is a firm rejection of technological determinism and the "rhetoric of inevitabilism". It asserts that we, as a society, can and must influence technology's path to align with democratic and humanistic values, rather than accepting its course as a foregone conclusion driven by market forces.
5. **Machines are not people.** This principle establishes a fundamental distinction, opposing transhumanist and post-humanist views by affirming the unique value of the human condition. It rejects the notion that people must put themselves at the service of technology and argues against blurring the lines between humans and machines.

Studies on digital humanism have grown since the publication of the Vienna Manifesto, with early contributions focusing on clarifying its philosophical foundations and normative ambitions. Coeckelbergh [10] positions digital humanism as a response to increasing autonomy and opacity in AI systems, arguing that the movement foregrounds human responsibility and moral agency in contrast to both techno-solutionism and post-humanist narratives. Similarly, Prem [4] critically examines the principles of digital humanism, highlighting internal tensions between its human-centred commitments and emerging debates around post-humanism, automation, and agency. These conceptual analyses establish digital humanism as an explicitly normative framework that seeks to reassert human values, democratic control, and societal deliberation in the governance of digital technologies.

Recent research has begun to explore how digital humanism relates to existing ethical and sociotechnical traditions. Serrano et al. [11] propose a bottom-up interpretation of digital humanism that emphasizes stakeholder participation and contextual value negotiation rather than fixed ethical principles. Their work situates digital humanism alongside traditions such as value-sensitive design and ethics-by-design, while also critiquing the limitations of top-down ethical guidelines that remain detached from real-world development practices. Díaz de la Cruz et al. [12] introduce an ethical analysis framework explicitly grounded in digital humanism principles and demonstrate its application in the evaluation of digital systems, including immersive and AI-enabled technologies. Their study represents one of the early systematic attempts to translate digital humanism from a philosophical stance into an actionable analytical tool, addressing critiques that humanistic approaches often remain abstract and difficult to apply in system development.

Although its motivation is widely shared, digital humanism remains a philosophical developing concept encompassing technical, political, and philosophical dimensions [4, 10].

3 Humanistic RE and AI in healthcare

Recent research in RE has increasingly focused on AI [13] and human-centred and humanistic approaches for such systems [14, 15]. This section examines how related work in RE and AI addresses human-centred concerns in AI-enabled systems. By analysing two influential frameworks, RE4HCAI and FUTURE-AI, we illustrate how existing approaches partially operationalise digital humanism principles and where important gaps remain. This analysis provides the conceptual basis for the research agenda proposed later in the paper.

3.1 RE for human-centred AI

Empirical findings reveal significant gaps in current RE practice and tooling for AI-enabled systems, highlighting the need to align RE activities with AI elements (data, model, system) to mitigate risks such as distributional shift and unsafe failures during elicitation and validation [15]. Ethical operationalization frameworks emerged to translate principles into actionable practices across data, model, deployment, and monitoring, complementing RE by embedding security, fairness, accountability, and oversight throughout the development lifecycle [16]. Embedded ethics integrates ethicists and social scientists within development teams to surface stakeholder values, anticipate harms, and co-design interventions [16], thereby supporting human-centred RE by continuously mapping ethical and social issues to requirements and workflows [17].

Among recent frameworks, one is specifically tailored to RE for human-centred AI (RE4HCAI) [7] and provides an approach based on insights from the industry practices for human-centred AI, a systematic literature review, and an expert survey. RE4HCAI proposes six human-centred areas, with iterative elicitation to address AI's "black-box" behaviour and handle errors in high-stake domains such as healthcare [7]:

- **User needs requirements**, defining how and why humans interact with an AI system, including user interaction, user awareness, visibility of AI features, and the reward functions.
- **Model needs requirements**, specifying the AI model's learning approach, training strategy, and optimization goals to ensure alignment with human-centred objectives such as accuracy, robustness, and explainability.
- **Data needs requirements**, capturing requirements for data sources, quality, legal compliance, and bias management to ensure that the AI system reflects real-world contexts and user needs.
- **Feedback/control requirements**, defining how users can provide feedback, adjust system behaviour, and maintain meaningful oversight over the AI system during use.
- **Explainability/trust requirements**, ensuring that users can understand the AI system's capabilities, limitations, decisions, and consequences, enabling informed and appropriate reliance.
- **Errors/failure requirements**, specifying how different types of errors and risks are detected, communicated, and handled to ensure safety and resilience in AI-enabled systems.

3.2 RE for human-centred AI-enabled healthcare

RE for human-centred AI-enabled healthcare centres human needs, values, and ethics in AI integration across the lifecycle, moving beyond purely technical specifications. Patient-centred guides emphasize autonomy, trust, equity, and shared decision-making, providing requirement checks for transparency, privacy, safety, and accountability in clinical adoption of AI [18]. Gatekeeping and evaluation tools (CARE-AI; FURM) operationalize ethical review, usefulness simulations, and prospective monitoring, bridging RE to deployment governance in healthcare [16, 19]. Value Sensitive Design methods (moral dialogue, ethical matrices) further translate societal and legal (e.g., GDPR) values into concrete system requirements [20, 21].

Among the most important initiatives is the FUTURE (Fairness, Universality, Traceability, Usability, Robustness, Explainability)-AI guideline in healthcare. FUTURE-AI is an international consensus defining six principles offering 30 best practices that can be instantiated as RE constraints and acceptance criteria [8]. Created by a consortium of 117 interdisciplinary experts from 50 countries representing all continents, its primary purpose is to address the limited real-world adoption of AI in healthcare due to concerns about technical, clinical, ethical, and societal risks. By providing a structured, holistic set of best practices, the framework aims to build trust among patients, clinicians, and health organizations, thereby facilitating the responsible deployment of AI-enabled systems.

FUTURE-AI is structured around six guiding principles:

- **Fairness**: AI tools should maintain the same performance across individuals and groups, ensuring that medical care is not compromised by biases related to attributes like sex, age, ethnicity, or socioeconomic status.
- **Universality**: An AI tool should be generalizable outside the controlled environment where it was developed, ensuring it can function effectively for new patients, users, and clinical sites.
- **Traceability**: Mechanisms should exist for documenting and monitoring the complete trajectory of the AI tool—from its development and validation to its real-world deployment and usage—to ensure transparency and accountability.
- **Usability**: End users should be able to use an AI tool to achieve a clinical goal efficiently and safely, meaning it must be both easy to operate and clinically useful without causing patient harm.
- **Robustness**: An AI tool must maintain its performance and accuracy when faced with expected or unexpected variations in input data, protecting against errors in real-world conditions.
- **Explainability**: Medical AI tools should provide clinically meaningful information about the logic behind their decisions, enabling users to understand, interpret, and appropriately trust the AI's outputs.

3.3 Mapping between digital humanism and RE4HCAI and FUTURE-AI frameworks

While digital humanism [4, 5] provides the *why* for responsible technology, it does not directly prescribe how these values should be translated into system requirements. RE frameworks can help operationalise these principles by translating humanistic values into concrete requirements, design constraints, and validation criteria. In this respect, RE4HCAI provides a requirements-level mechanism for *how* these values can be embedded, examined, and validated throughout the AI lifecycle, whereas the FUTURE-AI framework [8] offers a detailed roadmap for *how* to navigate this path in healthcare. To better understand how digital humanism principles can be translated into RE practices for AI-enabled healthcare, we map these principles and the areas/guidelines of RE4HCAI and FUTURE-AI.

Digital technologies are changing us and our lives. RE4HCAI operationalizes this principle through User Needs and Feedback/Control requirements that make explicit how AI systems shape user interaction, workflows, and decision-making over time, while Data Needs requirements prompt reflection on whether data and labels reflect lived realities. In the healthcare domain, FUTURE-AI complements this perspective through its principles of Usability, Explainability, and Traceability, which require AI tools to fit clinical practices, support human understanding, and be continuously monitored.

Digital technology must protect people and the environment. RE4HCAI supports human protection through Data Needs, Errors/Failure, and Explainability/Trust requirements that emphasize privacy, legal compliance, bias management, safety-critical error handling, and transparent communication of risks. Similarly, FUTURE-AI operationalizes this principle through verifiable requirements related to Fairness, Usability, and Robustness. However, neither framework explicitly addresses *environmental sustainability*, leaving ecological concerns such as the energy and material costs of AI outside their current scope.

Digital technology should strengthen democracy and society. RE4HCAI contributes indirectly to this principle through User Needs and Data Needs requirements that promote fairness, representativeness, and bias identification, thereby supporting more equitable AI systems. FUTURE-AI further advances these goals in healthcare through its principles of Universality and Fairness, which promote generalizability across clinical contexts and reduce the concentration of AI benefits in well-resourced settings. Nevertheless, *democratic participation* remains underexplored in both frameworks.

The use and application of digital technology can be shaped. RE4HCAI strongly embodies this principle across all six requirement areas by enabling iterative elicitation, continuous validation, and explicit feedback and control mechanisms that allow stakeholders to influence system behaviour throughout design, deployment, and evolution. FUTURE-AI complements this approach through a lifecycle-oriented methodology that supports intentional design, governance, and ongoing monitoring of AI systems in healthcare.

Machines are not people. RE4HCAI operationalizes this principle through Explainability/Trust and Feedback/Control requirements that preserve human agency by ensuring AI systems remain interpretable, contestable tools rather than autonomous decision-makers. Errors/Failure requirements further reinforce human accountability. In healthcare, FUTURE-AI strengthens this distinction through explicit human-in-the-loop mechanisms, clinically meaningful explainability, and governance structures that assign responsibility and liability to human professionals and institutions.

To better understand how these principles are interpreted in REWBAH contexts, the next section draws on insights from the REWBAH'25 panel discussion.

4 The REWBAH'25 panel

This section describes the REWBAH'25 panel discussion and the qualitative analysis process used to derive the themes presented in Sect. 5. The REWBAH workshop is an open and inclusive event that brings together researchers and practitioners from different fields. Participants include experts in software and systems engineering, RE, medicine, health sciences, psychology, and related disciplines. This broad mix reflects the complexity of health and well-being challenges, which cannot be addressed by technology alone. The workshop also aligned closely with the theme of the 2025 RE conference *"Future-proofing Requirements Engineering"* by considering how RE can remain relevant in tackling pressing social and technological issues. The workshop began with a keynote presentation entitled "*Designing and Deploying Assistive Technologies: From Requirements Definition to Real-World Use*" [22]. This was followed by six paper presentations that addressed different aspects of technology design for health and well-being. The final session was a panel discussion on *Digital Humanistic Perspectives on REWBAH*.

Twelve participants contributed to the conversation, which was structured around principles from the Vienna Manifesto for digital humanism. The aim of the panel was to create a space for cross-disciplinary exchange and critical reflection. The organizers encouraged participants to reflect on how REWBAH research and practice could be guided by the following values, displayed in a document to the participants:

- *Human-centric approach*: Technologies should be shaped according to human values and needs, ensuring that humans remain at the centre of technological progress.
- *Promotion of democracy and inclusion*: Digital systems must be designed to support democracy, overcome inequalities, and foster inclusive societies.
- *Safeguarding privacy and freedom of speech*: Privacy and free expression are essential values that must be central in all digital development efforts.
- *Effective regulation and accountability*: Broad public dialogue should inform the development of new regulations to ensure transparency, fairness, and accountability in digital systems and algorithms, particularly where monopolies impact competitiveness.
- *Human oversight in decision making*: Decisions impacting individual or collective human rights must be made by humans, with automation only supporting—not replacing—this process.
- *Interdisciplinarity*: Scientific and educational efforts must encompass technology, the social sciences, and the humanities to address digital challenges collaboratively.

The panel discussion was audio-recorded after obtaining verbal consent from all participants. A transcript of the conversation was generated using Klang.ai, a GDPR compliant tool. Initial brainstorming of the thematic analysis was conducted with the assistance of Generative AI (GenAI) tools accessed through the chat interfaces of ChatGPT and Claude. The interactions with GenAI tools were conducted by the second author on September 12, 2025, using the default models available through the ChatGPT and Claude interfaces at that time. The GPT-4.1 model was also selected and used through the ChatGPT interface. A general prompt was used to ask GenAI tools to propose potential themes related to digital humanism from the transcript attached. The transcript did not contain any sensitive information. We assumed that GenAI tools based on large language models (LLMs) could assist in the identification of preliminary themes in the transcript, as reported in other studies [23, 24]. To mitigate limitations reported on the use of LLMs for thematic analysis [25, 26], such as issues related to accuracy, consistency, and lack of methodological rigour, we maintained researcher oversight through the process. Table 1 presents the generated themes per GenAI tool.

The generated themes presented in Table 1 were checked against the transcript. An initial selection of emerging themes was carried out by the workshop organizers, which was then refined via email and discussed and agreed upon in a meeting with the co-authors.

Table 2 presents participants' area of expertise and number of years of experience in the field of REWBAH. All participants were invited to collaborate on a paper based on the panel discussion, and six contributed to this research commentary. In addition to the insights from the discussion, three senior researchers with expertise in REWBAH who were not part of the panel also contributed to the manuscript.

Our positionality was shaped by the multicultural and multicontextual composition of the panel. Participants contributed expertise including RE, software engineering, human-computer interaction, health informatics, and information systems, and represented a range of career stages, from PhD students and postdoctoral researchers to junior and senior faculty members. The combination of disciplinary diversity and international experience offered a broad set of viewpoints on digital humanism within REWBAH in the age of AI. However, we also acknowledge that these positionalities, while enabling participants to recognize key

Table 1 Generated themes

GenAI tool	Generated themes
Default model through the ChatGPT interface	1. The Importance of Human-Centered Design in Healthcare AI 2. The Role of Interdisciplinary Collaboration 3. The Nuances of Cultural and Individual Differences 4. Balancing Technological Advancement with Ethical Considerations
GPT-4.1 through the ChatGPT interface	1. Digital Humanism in Healthcare AI: Balancing Innovation with Human Values 2. The Evolving Human-AI Partnership in Healthcare Decision-Making
Default model through the Claude interface	1. Digital Humanism as Healthcare AI Framework a. Cultural Competence in Healthcare Systems b. Data Bias and Categorization Risks 2. Human-AI Collaborative Decision-Making a. Emotional and Psychological Aspects of Care b. Healthcare Access and Wait Time Issues c. Cognitive Processes in Clinical Work 3. Interdisciplinary Collaboration Imperative a. Technical Implementation Challenges b. Requirements Engineering Process Adaptation c. Sustainability and Resource Considerations

Table 2 Panel participant information

Participant	Areas of expertise	Experience in REWBAH (in years)
P1	Software engineering, human-computer interaction, sustainability, and health informatics.	11–15
P2	Software engineering, requirements engineering, design thinking, health informatics, sustainability, and knowledge management.	11–15
P3	Biomedical engineering, assistive technology, service development, health informatics, co-design, human-robot interaction, and data analysis.	11–15
P4	Software and requirements engineering, digital health, EEG data acquisition and processing, future internet infrastructures, deep learning for operating theatre monitoring, and generative AI applied to cancer research.	11–15
P5	Software and systems engineering, requirements engineering, quality models, software process improvement, and smart cities.	6–10
P6	Information systems, human-computer interaction, and digital health.	6–10
P7	Formal methods, software engineering, and requirements engineering.	6–10
P8	Psychology and computer systems, some experience in AI applied to patient management in cancer research.	1–5
P9	Decision making and health informatics.	1–5
P10	Automation and complex systems.	1–5
P11	Software engineering, machine learning, cloud computing, and security.	1–5
P12	Requirements engineering, software architecture and design, software quality, privacy, and security.	1–5

opportunities and challenges in applying digital humanism to RE, may introduce implicit biases into our interpretations.

5 Perspectives from the REWBAH'2Panel

The following subsections present the key themes that emerged from the panel discussion supported by related literature.

5.1 Theme 1: the necessity of interdisciplinary collaboration

One of the main themes emerging from the panel discussion is that meaningful progress in healthcare technology is influenced by strong interdisciplinary collaboration. From a digital humanism perspective, RE for healthcare must acknowledge that no single discipline can adequately address the complex social, ethical, and technical dimensions of healthcare systems. Participants emphasized that designing digital health systems should not be the task of software engineers alone. Instead, collaboration among several stakeholders such as clinicians, linguists, psychologists, and social scientists is essential to ensure that requirements and resulting systems truly serve human needs.

It is essential to anticipate synergistic collaboration among the various categories of stakeholders with diverse backgrounds not only during the requirements elicitation phase, but also throughout design, development, and testing to ensure effective validation. Stakeholder engagement should therefore be both iterative and reflective, enabling continuous assessment of what has worked well and what has not. This approach supports timely methodological reshaping as the work progresses, fostering more robust and adaptive outcomes [27]. One participant highlights how even aspects like prompt design for LLMs require understanding of language, cognition, and human interaction by stating: "*I trust in the interdisciplinary vision ... [working] with other disciplines that are not engineering ... support us to open our minds and... maybe write also the right prompt because [writing] ... prompts is a linguistic problem*, *not only an engineering problem.*"

Another participant, reflecting on years of experience, noted that collaboration requires more than technical integration. For example, in the Horizon 2020 project PHArA-ON[1], engineers used Git while non-engineers preferred using Excel. Such differences highlight practical challenges of interdisciplinary collaboration in RE processes. It also requires humility and willingness to learn: "*The first step is to learn how to work with other people and listen*, *and not to [impose] your ideas because you have some mental training.*" Participants therefore emphasized the importance of developing digital health grounded in empathy and mutual respect across disciplines, aligning with calls for a critical and conscious digital humanism that embraces transdisciplinary collaboration through dialogue [28].

Several participants described how interdisciplinary approaches have already created value in their projects. One researcher explained: "*We saw… a wonderful collaboration*, *multidisciplinary collaboration between data scientists… and social workers… and it looks like we have found an interface that in an asynchronous way allows these two*

[1] https://www.pharaon.eu/.

disciplines [to actually] work together and eventually create value." Such examples illustrate how interdisciplinary collaboration can enable complementary expertise to shape requirements, system design, and deployment practices.

This theme reflects the first principle of digital humanism, focused on the positive and negative impacts of digital technology on society through their coevolution. Theme 1 emphasizes that this coevolution emerges through exchanges between technical and non-technical stakeholders with diverse disciplinary perspectives. These exchanges generate learning through the communication of requirements that can lead to a coevolution of mindsets that is necessary to generate meaningful and relevant healthcare technology. The RE community is increasingly recognizing the need to develop human-centred approaches that account for the interweaving of technology and end-users [29]. Such approaches are inherently interdisciplinary and include the development and use of personas to empathize with end-user requirements [30, 31], which can ensure that the potential impact of a digital solution on vulnerable social groups such as children and the elderly is considered during the analysis, design, and development process [32]. Co-design methods and tools enabling collaboration between requirements engineers and end-users are another example [33, 34]. This concern is perhaps most visible in relation to AI systems, leading to initiatives such as the recent International Workshop on Requirements Engineering for Accountable and Conscious Human-centred AI (REACH-AI) [35].

5.2 Theme 2: the nuances of cultural and individual differences

This theme emerged from several personal and research-based stories. One participant described projects with older adults [36] and culturally diverse communities: "*We were working with older adults [majority Hispanic] ... [we had to adapt traditional usability studies to take] into consideration [their] cultural aspects ... so we can better inform [software developers] in understanding the culture of somebody else before [they] develop the system.*" Then, they shared how a hospital's design process had unintentionally ignored the social realities of its patients: "*All the doctors were white and all the patients were black. you don't understand that you should not just pass the patient. You need to pass the grandma and the uncle, and whoever, because they [are part of] their support system.*" These experiences helped develop a Framework for Cultural Competence in the organizations [37]. Other participants touched on gender differences, as one participant emphasized: *"Women ... experience heart attacks differently than men, so [when] they go to the emergency, doctors just dismiss [them]... while [they are] actually experiencing a heart attack. So it's not only about culture, but there are also other nuances that should be considered."* These examples illustrate how cultural, social, and physiological differences can significantly influence healthcare experiences and must therefore be considered in the design of digital health systems.

Understanding the cultural nuances of a target community can increase the use and adoption of information systems. A culture shapes the behaviours of a population, which are reflected in their norms (e.g., tradition, religion, social environments) and values (e.g., beliefs, trust, familism). The Cultural Elements Framework for Information Systems (CEFIS) supports software engineers in eliciting culturally relevant requirements that reflect the cultural contexts and lived experiences of the communities they serve [38]. Focus group results of using CEFIS to implement alternative prototypes of a food pantry reported improved comprehension, a stronger sense of cultural belonging, and a greater intent to use the information system in their daily lives.

The panel also stressed that digital health systems must account for the diversity of human experiences, also in terms of different digital literacy and access to technology. Participants cautioned that these systems risk dehumanization when they impose homogenized categories on diverse populations, thereby overlooking individual circumstances and lived experiences. As one speaker stated: "*Since people are inherently different ... when you create automation, you kind of categorize people ... you take away all these things that make you you.*" This recognition of human diversity challenges requirements engineers to design digital health systems that respect, rather than erase, cultural and individual variation. Participants also emphasized that individuals exist within broader social networks and care ecosystems, ecosystems of relationships and bondings, that vary according to the cultural contexts and should therefore be considered during system design.

These reflections highlight that cultural and individual nuances must be part of RE and that digital humanism in healthcare means designing with these differences in mind, not designing around them. For instance, in the EU-funded PHArA-ON project [39], there were noticeable differences in digital literacy between Northern and Southern European countries. Such differences illustrate how socio-cultural context can shape user interaction with digital health technologies. Hence, requirements engineers should avoid "blackboxing" users and stakeholders and instead understand and articulate the nuances and variety of needs that different individuals and groups have toward a system.

Such a view reflects the fourth principle of digital humanism, which emphasizes that the use and application of digital technology *can* be shaped, rather than being technologically deterministic. Theme 2, which highlights requirements engineers' responsibility in shaping the development of software applications, resonates with recent work in RE. For example, an emerging body of work has begun investigating the impacts of the cultural context of the requirements process and the culture of individual stakeholders on the results of requirements processes, alongside other human aspects such as personality, emotions and gender [40–42]. This perspective is particularly relevant in the context of ageing, where a gap may exist between younger developers' understanding of digital systems and ageing people's actual requirements for digital health solutions [43]. The cultural aspect is particularly important because, according to modern emotion theory, emotions are psychologically and socially constructed individual experiences embedded within a cultural context, which should be considered by RE [44]. Ways to incorporate human aspects, including personal characteristics and end-users' emotions, have also been proposed in the context of goal oriented RE [45, 46].

5.3 Theme 3: human-AI collaborative decision-making

Much of the discussion centred on how humans and AI systems can collaborate in making decisions in healthcare. While participants generally saw great potential for AI to improve efficiency and data processing, they were united in arguing that final decisions must remain in human hands. As one participant stated: *"AI can be used as a support ... to aggregate data in a more human-like way so the doctor can read the data and in an easy way ... [but] the clinical evaluation ... should remain human."* This perspective emphasises that in healthcare, decision-support systems should augment, rather than replace, human expertise.

Several participants offered examples to illustrate the promise and the risks of human-AI collaboration. A participant observed that automated eye-screening can help prioritize patients: "*You can have AI saying, a doctor needs to see this person ... it's incredible ... it's just helping prioritize people's time, but having a person at the end, I think this is fantastic and highly needed.*" Others warned that excessive automation might weaken human reasoning. A participant remarked that as a clinician "*when you [automatically summarize] the discussion between the patient, I'm losing the cognitive process. But when I'm writing, I'm thinking ... I'm thinking what is her problem. I know her.*" These reflections highlight concerns that automation may unintentionally reduce opportunities for reflective clinical reasoning.

Several participants proposed a balanced approach, where AI accelerates diagnosis and handles routine data analysis based on clinical history and other datasets, while humans provide empathy, intuition, contextual judgment, and ethical reflection. As one participant put it: *"The last mile needs to be human for human interaction, for humanity to survive. But the diagnostics can be accelerated."* The debate over intuition captured this point. While some participants argued that AI could learn from vast statistical patterns, others insisted that intuition is a uniquely human skill. One panellist clarified: *"Intuition of the doctor, officially now ... is not one of the skills that foundation models have been trained for. They have been trained for knowledge aggregation and retrieval, reasoning, inference, and so on. Not intuition. They have been trained to mimic emotions, sympathy, empathy."* These comments suggest that while AI may simulate empathy or provide reasoning, human judgment remains central in clinical decision-making, supported by systems designed to complement and extend human abilities.

The inclusion of AI in the healthcare process should also include approaches related to the necessity of providing "explainability" mechanisms, as presented in RE4HCAI [7], so that clinicians can interpret and critically assess AI-generated recommendations during their decision process.

The discussions within this theme reflect the fifth principle of digital humanism, which emphasizes that we should consider the unique value of the human condition rather than blur the line between humans and machines. Indeed, Theme 3 conveys the view that digital technology should be at the service of humans but that it could not replace them because core human characteristics, such as intuition, are not only irreplaceable but more important [4]. The concern towards the primacy of human needs in digital solutions can be seen in a number of RE topics. A growing body of research in this perspective focuses on articulating, integrating and evaluating human-focused non-functional requirements such as fairness, transparency and explainability in RE processes and outputs in the context of AI systems [7, 47, 48], which is of particular importance in healthcare where the lack of algorithmic fairness can lead to inequalities in the quality of care [49]. The focus on fairness is part of a greater concern towards the need for requirements engineers to contribute to creating responsible AI systems [50].

Beyond maintaining human oversight in principle, panel insights point to the need for more concrete mechanisms that preserve human judgment in AI-supported decision-making. One promising approach is cognitive forcing, which is informed by the dual-process theory of cognition [51]. This theory distinguishes between two cognitive processes: (1) *System 1 thinking*, which is a fast, automatic, and intuitive process that relies on heuristics and mental shortcuts. While efficient for most daily decisions, it can expose individuals, even experts, to cognitive biases and lead to incorrect or suboptimal decisions. (2) *System 2 thinking*, which is a slower, deliberate, and analytical process that requires significant cognitive effort. System 2 also serves as a monitor, able to override the decision of System 1, in case it is incorrect or suboptimal. However, there are cases in which a non-normative decision of System 1 feels reliable enough to leave System 2 dormant.

Cognitive forcing functions are interventions applied at the moment of decision-making to disrupt heuristic reasoning (System 1) and instead compel an individual to engage in more analytical and effortful thinking (System 2) [52]. In AI-assisted decision-making, cognitive forcing aims to overcome overreliance on AI-powered decision-support tools, which may sometimes lead to poorer performance than when the AI operates alone [53]. Examples of these interventions include asking the user to make a decision before exposing them to the AI's recommendation, thereby reducing anchoring bias where users' initial decisions are influenced by the AI's suggestion if presented first [54]; slowing down the process by delaying the presentation of the AI's recommendation, targeting to motivate users to form their own hypotheses during the waiting time, and only then evaluate the AI's explanation against their own [55]; and let the user choose whether and when to see the AI recommendation (on demand), aiming to force explicit requests to encourage engagement.

5.4 Theme 4: the need to balance technological advancement with sustainability and emotional considerations

Another theme that emerged from the discussion was the need to balance innovation with ethical reflection. Participants were enthusiastic about technological progress but also cautious about its social, emotional, and environmental consequences. As one participant reminded: *"When we are talking about healthcare, it's important [to] remember that we are dealing with human beings, with patients that are frail ... But also the doctors... sometimes the doctors don't have time, so if we find a way to save time, hospitals are happy, doctors are happy, but we need to find a way to guarantee ... to maintain the relationship between the patients and the doctors."* Another highlighted the environmental costs of AI: "*We can create a lot of AI agents ... but we need to consider the cost of these systems and how they influence the nature and the world ... we need to speak about the ecological aspect ... about our energy resources that are wasted way beyond ... we need to develop some kind of roadmap and process and identify pros and cons about creating an AI agent."* These remarks illustrate the tension between technological innovation and broader human, social, and environmental considerations.

The ethical argument also extended to the emotional dimension of care. One participant noted that *"people want emotional connections, not artificial connections ... when I speak with physicians, they know that people come for nothing, they come only for talking with someone and it's okay with them, it is part of the work."* This note highlights that healthcare interactions often involve emotional support that cannot easily be replaced by digital systems. This resonates with digital humanism's emphasis on dignity as a non-negotiable value in system design. Other participants linked digital humanism to inclusion and fairness: *"promotion of democracy and inclusion... making an inclusive system" that identifies users from diverse target population sectors and considers their specific challenges*, limitations and needs rather than designing a system for a generic user. Differences in culture, educational background, and income create distinct challenges and service needs, requiring software developers to tailor information systems to more effectively meet the needs of diverse user populations.

Lievrouw and Farb [56] consider that both vertical and horizontal dimensions of Information Equity must be addressed. The vertical dimension refers to the equitable distribution of information resources across different social groups, while the horizontal dimension ensures that all the individuals have the required skills and background to use the information effectively. Lievrouw and Farb also indicate that software development organizations should train their software engineers in social aspects so they can be empathetic to the needs and limitations of the communities they are assisting. Such training may help software engineers design services that better meet the needs of diverse populations. Participants agreed that *"safeguarding privacy is absolutely important"* but some highlighted the need for flexibility as one panellist argued that "*it's ideal to safeguard privacy and also have effective regulation and accountability, but when it comes to the real world and what can be useful and beneficial, sometimes we need to have also this flexibility ... when we are dealing with different perspectives.*"

The panel also warned against confusing simulation with reality. One participant cautioned: *"We are humanizing the beast. It's technology, it's not a person. It mimics human behaviour, it's not a human."* This statement captures the heart of digital humanism's ethical stance, which is that technology must remain a tool for human flourishing, not a substitute for human relationships.

This theme, by emphasizing the need to balance ethical considerations and innovation, reflects the second principle of digital humanism, which takes the stance that digital technology should protect people and the environment. This concern is particularly apparent in relation to patients in the context of REWBAH, but also for healthcare workers and the wider social and ecological contexts in which health systems are situated. In RE, extant research in line with this principle includes research focused on ethical concerns in RE methods. Despite the development of ethical

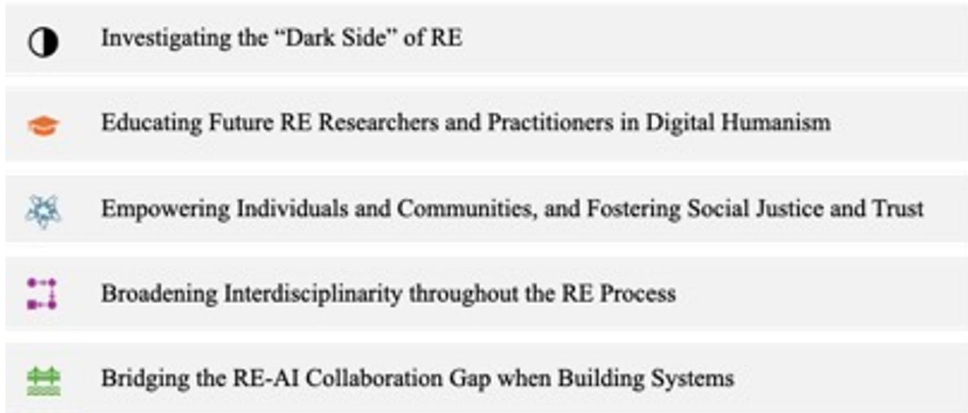

Fig. 1 Research agenda

frameworks and methods for RE, important challenges remain in implementing them due to lack of practitioner guidance and issues such as distributed accountability [57–61]. Another important topic for this principle is the work concerned by the way in which RE methods can generate sustainable information systems [62–65].

From the RE perspective, these concerns point to the need for explicit emotional requirements alongside functional and quality (i.e., non-functional) requirements. Regarding the emotional dimension of healthcare and well-being, humans expect information technology to be built in such a way that it would also consider their emotional needs. This particularly applies to AI systems where end users expect these systems to be empathic. Therefore, explicit elicitation, modelling, and validation of emotional requirements are needed, in addition to functional and quality requirements. Emotional requirements [66] capture how end users should feel when using a digital system, and inadequate consideration of such requirements results in their reluctance to use the system. Considering this, in the PHArA-ON project about designing an ecosystem of technologies for older adults and their caregivers, a methodology for engineering emotional requirements [39] was devised. This methodology consists of specifying the context of use, elicitation, modelling and refinement of emotional requirements, along with functional and quality requirements, mapping requirements to the software architecture and technologies, and evaluating the requirements. As stakeholders express their desired emotional requirements using very different terminology and expressions, a prototypical dictionary of emotional requirements was put forward for the healthcare and well-being domain that offers a clear and organized set of terms, which can be used to properly elicit emotional requirements from the stakeholders [67].

The emotional dimension of healthcare and well-being is closely related to human values [68–71]. In the work of Iqbal et al. [72] and Taveter and Gharib [73], a method was proposed of deriving human values of the human values' theory by Schwartz [68–74] from emotional requirements represented as emotional goals of motivational goal models [46, 75, 76]. The method is based on a study that describes emotions related to human values along the four major categories of human values according to the refined human values' theory by Schwartz [68].

6 Research agenda

While the aforementioned themes show that the field of REWBAH is driven by humanistic values, there are clear opportunities to further the realization of these values through research and practice. In particular, digital humanism emphasizes that AI-enabled healthcare technologies must protect human dignity, strengthen democratic participation, and remain accountable to society. In this paper, digital humanism is used as a lens to connect existing RE and AI frameworks (RE4HCAI and FUTURE-AI), and panel insights, and to inform the following proposed research agenda (Fig. 1) and research questions to address the digital humanism gap in RE for healthcare in the age of AI.

Investigating the "Dark Side" of RE. Digital humanism highlights that digital technologies must *protect people* and *strengthen democratic values*. This principle also requires critical reflection on the potential harms that engineering practices themselves may introduce. An important research direction therefore concerns the potential negative outcomes of RE practices themselves. There is a need for requirements and software engineers to develop a deeper understanding of individual and social concerns in software development processes in order to use more inclusive processes and to adapt methods to specific stakeholders such as marginalized groups [77–79]. Also, the potentially negative impacts of human aspects on the RE process as well as on the quality of resulting requirements has been documented [41, 80]. However, the negative impacts that RE processes or deliverables may have on individuals or society have received limited attention. There has been a call to take negative economic and safety issues into consideration when assessing the quality of requirements processes [81], and to raise requirements engineers' awareness of the sustainability effects of software systems [82]. However, we should further examine how requirements elicitation and specification could unwillingly constrain users' rights. For example, elicitation practices that rely exclusively on organizational stakeholders can result in systems that monitor workers without their meaningful consent, thereby undermining privacy rights. Similarly, requirements that prioritize efficiency or risk management may lead to automated decision-making systems that restrict individuals' access to health care or employment opportunities without adequate avenues for contestation. Empirical research is thus needed to investigate the ways in which RE processes and deliverables have limited user rights, negatively impacted specific social groups or favoured groups in power over marginalized or vulnerable groups. Addressing these issues is important for ensuring that RE practices themselves align with digital humanism, especially within WBAH (Well-Being, Aging, and Health) contexts, where the risks of harm are particularly high. Early viewpoint work by Leite and Freeman [83] is relevant in the context of WBAH because it treats multiple perspectives and conflict as central to requirements modelling and validation. Their work shows that requirements should be elicited from different viewpoints, and that examining differences among them can support early validation. Revisiting this early work for REWBAH in the age of AI can therefore shed light on the "dark side" of RE, particularly on its broader social impact. The limited recognition in RE of computing's broader social impacts may have contributed to an overemphasis on individual users. However, this concern is not new. Early work on the social aspects of computing, such as Rob Kling's work in 1980 [84], argued that to "identify the social impacts of computing, one must have, at least implicitly, a theory of the causal powers that computerized systems can exert upon individuals, groups, organizations, institutions, social networks, and other social entities." Similarly, Jackson argued in [85] that many systems require explicit descriptions of properties and behaviours in the problem domain that are remote from the machine interface.

Research questions that would help to advance REWBAH in this direction include: *(1) How do commonly used requirements elicitation practices in RE systematically exclude or silence certain patient*, *caregiver*, *or community perspectives*, *and what consequences does this exclusion have for the protection of user rights such as privacy*, *autonomy*, *and informed consent? (2) How do requirements specifications and system models used within WBAH systems encode assumptions about aging*, *disability*, *or health-related behaviour*, *and how do these embedded assumptions lead to discriminatory or exclusionary system outcomes? (3) How do traceability practices—or the lack thereof—affect the visibility of user rights considerations within requirements deliverables for WBAH systems*, *and how does this influence the emergence of harmful or rights-eroding features in final software products*?

Educating future RE researchers and practitioners in digital humanism. The Vienna Manifesto explicitly emphasizes the role of the academic sector in shaping digital humanism. This emphasis is further supported by a recent textbook [86] that introduces digital humanism for students, teachers and policymakers, framing it as a way of describing, analysing, and shaping the complex interplay between technology and humankind. Accordingly, integrating digital humanism in RE education becomes a pressing need to prepare future RE researchers and practitioners. Research is needed to explore how digital humanism can be systematically integrated into RE education, including studies of curricular design, pedagogical approaches, and their impact on learners' competencies and professional practices. This is of particular importance given the integration of GenAI in classrooms and professional training, which is often done without explicit considerations for ethics (e.g., the perception of WEIRD (Western, Educated, Industrialized, Rich, and Democratic) coverage of LLMs [87]) and environmental sustainability (e.g., impact of data centres on natural resources [88]). There is also a need to stress the importance of interdisciplinarity in RE education [89]. Although RE is supposed to consider multiple perspectives [90] when eliciting requirements for software systems, AI-enabled healthcare systems require engagement with a much broader list of stakeholders, including data scientists, AI engineers, clinicians, ethicists, social scientists, sustainability specialists, and patient organizations. Preparing future RE researchers and practitioners requires teaching software engineering and AI engineering students interdisciplinary skills and human values to enable them to engage effectively with other disciplines [56, 91]. One practical way to do this is to have project-based learning focused on AI-enabled systems in healthcare as part of their RE education. Such projects would require students to interact with a multitude of stakeholders to make sure that the specified requirements align with human values.

The following questions are examples of potential research questions for advancing RE education: *(1) How can digital humanism principles be effectively integrated into RE education to enable students to elicit and specify verified and clear requirements for such systems? (2) What are the approaches and tools that RE students should be equipped with to tackle interdisciplinary collaboration in such systems? (3) How should pedagogical approaches and* *learning environments be modified to prepare students for the complexity of AI-enabled health systems? (4) How can RE be part of non technological experts' (e.g. clinicians, social workers) AI-based systems education, and what is the impact of such integration?*

Developing RE approaches for empowering individuals and communities, and fostering social justice and trust [92]. Advancing digital humanism commitment to democracy, social justice, and human agency requires RE methods that explicitly address these values. This is also echoed in the healthcare AI literature. Long et al. [93] found in their narrative review that Value Sensitive Design remains understudied in applied health AI research, despite its relevance for supporting design processes that are not just human-centred, but explicitly value-sensitive. The application of Value Sensitive Design to AI is an emerging research direction [94]. Value-sensitive AI is concerned with developing more inclusive and human-centred AI by integrating human values into socio-technical design processes. Sadek et al. [95] proposed three criteria for evaluating such processes (i.e., comprehensiveness, the level of guidance offered, and methodological value sensitivity), which could be relevant to inform RE approaches that reflect human values. Liao and Muller [96] proposed participatory design fictions as a way to enable value-sensitive AI systems to help potential stakeholders elicit and reflect on value issues of future AI technologies. Despite emphasis on the importance of designing for humans, there is little discussion in RE about social justice, freedom, and trust. At the same time, scepticism and resistance toward AI technologies remain common, often due to limited familiarity or concerns about reliability and ethical implications, and a lack of transparency in how AI-enabled systems operate. This underscores the importance of explainable AI in increasing trust and understanding. For example, clinicians responsible for patient care, and the patients whose health is at stake, often have no way of knowing which values are embedded in the AI systems they rely on [97]. To alleviate these concerns, it is also important to provide adequate training to future users of AI-enabled software tools. Ehsan and Riedl [98] introduced Human-Centred Explainable AI, which advocates a reflective socio-technical approach to explainability by placing humans at the centre of technology design and developing a holistic understanding of who the relevant human stakeholders are. Rather than replacing human expertise, AI-based tools should be framed as clinical decision-support systems [99] that enhance professional judgment and service delivery. Importantly, it has been suggested that health professions educators should define new competencies for using clinical decision-support systems in clinical practice, and these training requirements should be incorporated into medical education programs at all levels and evolve with the technology [100]. It has also been suggested that developers, manufacturers, and content authors specify appropriate training requirements for end-users [101]. In this context, new professional roles may be required to facilitate the adoption of technological solutions and to mitigate the digital divide that can arise from heterogeneous socio-cultural backgrounds. Promoting digital literacy will be essential to ensure equitable access and meaningful use of AI-enabled systems in healthcare and social services. In addition to training and promoting digital literacy, beginning from the requirements, explainability should be designed as an intrinsic characteristic of any clinical AI-based decision-support system [102]. Embedding these concerns directly into requirements specifications is an important step toward operationalising digital humanism in RE practice.

The following questions are examples of potential research questions for empowering individuals, promoting social justice and trust, and fostering digital humanism in RE for healthcare in the age of AI: *(1) What RE methods are required for realizing requirements that empower users and enable social justice and human emancipation? (2) What types of requirements are conducive to user empowerment, trust, and social justice? (3) How can RE practitioners be trained to address stakeholders' needs and barriers regarding AI-driven systems in healthcare and social services?*

Broadening interdisciplinarity throughout the RE process. Digital humanism rejects technological determinism and argues that digital systems should be shaped through collaboration among diverse disciplines and societal actors in accordance with human values. Shahin et al. [103] highlighted that eliciting human values in requirements is challenging because of values characteristics (tacit, subjective and socially situated), stakeholders characteristics, and lack of practical solutions to elicit human values. Broader interdisciplinary RE activities are therefore central to realizing this purpose. Future work should explore how RE can contribute to designing resilient, sustainable healthcare systems and how environmental concerns can be incorporated into RE practices in meaningful ways. Requirements engineers should not limit themselves to only traditional elicitation techniques [104], but should also consider relevant requirements elicitation techniques from the use of AI in other domains. Another challenge concerns the engagement of stakeholders such as clinicians and patients in RE processes. Their limited availability or ability to participate may lead to insufficient engagement with the developed solution and reduce the effectiveness of human-centred design. Research is therefore needed to develop interdisciplinary RE approaches that enable meaningful participation from these stakeholders, while respecting their practical constraints.

The following questions are examples of potential research questions for advancing interdisciplinarity that fosters digital humanism in RE for healthcare in the age of AI: *(1) How can RE processes be tailored to respectfully and effectively engage health-related stakeholders whose ability to participate may be constrained by clinical workload, fatigue, frailty, stress, or cognitive burden? (2) How can we use technology to improve accessibility to health-related stakeholders, and what incentives are required to motivate their involvement? (3) How can RE processes ensure the identification and inclusion of all relevant stakeholders so that diverse voices, barriers, and needs are taken into account?*

Bridging the RE-AI collaboration gap when building systems. For digital humanism to be realised in AI-enabled healthcare systems, RE expertise must be closely integrated with AI development practices. Current development practices reveal a gap between RE specialists and AI practitioners. On one hand, several teams developing AI systems inconsistently use RE methods or apply ad hoc practices when developing machine learning (ML)-enabled systems. RE specialists are absent and RE activities are performed by data scientists [105]. On the other hand, many RE specialists lack AI domain expertise posing a risk to creating incorrect and/or incomplete AI system specifications [106]. The AI domain also introduces non-traditional requirements related to (a) data quality and data source, (b) model performance metrics, (c) uncertainty, trust, and fairness, (d) characteristics for explainable AI models, (e) the AI model carbon footprint, and (f) legal and ethical challenges [107]. Regarding RE tools, companies make use of RE tools and modelling notations such as UML when developing AI-based software [15]. However, engineers using UML are struggling to specify new quality attributes such as transparency and to capture data and model-centric requirements [7]. Bridging this collaboration gap is therefore essential for ensuring that AI-enabled healthcare systems are developed in accordance with the human-centred principles of digital humanism.

The following research questions address the domain knowledge gap between RE specialists and AI/ML specialists, and the collaboration gap among them: *(1) What organizational policies and professional certifications are needed to support AI-based healthcare system development teams? (2) How can ML-specialists increase the use and adoption of improved RE techniques and tools when building healthcare systems with AI components? (3) What is the minimum composition of Subject Matter Experts needed in an AI-development team (e.g., data science, ML specialist, RE, social scientist, and healthcare-related professional), and what collaboration model can support the elicitation of non-traditional AI requirements and AI quality attributes?*

7 Conclusion

This research commentary explored how RE may improve digital humanism in AI-enabled healthcare by synthesizing insights from the digital humanism principles, existing human-centred AI frameworks, and the REWBAH'25 panel discussion. The synthesis highlights that while existing RE and AI frameworks already address important concerns such as fairness, explainability, and human oversight, several dimensions central to digital humanism remain only partially operationalised in current RE, including democratic participation, environmental sustainability, and broader sustainable impacts. Building on this synthesis, we call for RE researchers to play a more prominent role in producing knowledge that can generate healthcare solutions for the common good.

Despite the relevance of RE in integrating digital humanism with AI-enabled healthcare systems, requirements engineers are often overlooked when designing such systems. Therefore, there is a need for the RE community to assert itself in shaping healthcare systems in the age of AI. The proposed research agenda and its research questions represent a step in that direction. This research commentary is informed by perspectives from the panel and by related literature. Its contribution should therefore be understood as a set of conceptual reflections and research directions, which call for further empirical RE research in the context of WBAH. This paper aims to stimulate discussion and guide future empirical and methodological research at the intersection of RE, digital humanism, and AI-enabled healthcare. Empirical studies on RE practitioners and their ability to influence and integrate digital humanism in new systems, in particular AI systems, will be essential for understanding how these principles can be operationalised in practice and for shaping responsible digital healthcare.

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Data availability Transcript is available from the corresponding author upon request.

Materials availability Not applicable.

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Declarations

Conflict of interest The authors declare no competing interests.

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