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Towards informational social epistemology

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Abstract

Introduction. Luciano Floridi's claim that library and information science (LIS) and social epistemology (SE) are '*siblings*' sharing a common parent discipline in the philosophy of information (PI) invites reconsideration of how SE might evolve if grounded in PI. Such an approach would explicitly place information at the centre of SE, reshaping our understanding of its role in shaping epistemic environments and fostering collaboration between SE and LIS.

Method/analysis. The findings were obtained from a review and conceptual analysis of relevant literature in PI, SE and LIS.

Results. This paper introduces informational social epistemology (ISE), a framework that bridges the theoretical insights of PI with the shared concerns of SE and LIS. ISE integrates Sanford Goldberg's focus on epistemic dependence – how individuals and communities rely on others in social routes to knowledge – and extends this to our growing dependence on technologies, proposing that technologies can be understood as artificial epistemic agents in the framework of Floridi's theory of knowledge as accounted-for information.

Conclusion. ISE redefines the role of LIS from curating to engineering epistemic environments and places emphasis on accountability rather than traditional notions of responsibility when designing, evaluating and improving the technologies on which our epistemic activities depend.

Introduction

Social epistemology (SE) and library and information science (LIS) are distinct yet conceptually overlapping disciplines, each concerned with the processes and systems through which information and knowledge are acquired, organised and disseminated. SE traditionally focuses on the social dimensions of knowledge, while LIS – as traditionally conceived – is primarily concerned with the management of information: its creation, organisation, accessibility and preservation. Floridi (2002) critiques SE as a conceptual foundation for LIS, arguing that its focus on knowledge, while marginalising information, makes it too narrow to address the wider concerns of LIS, in which information plays a central role. Instead, he suggests that SE and LIS are '*siblings*', both grounded in the philosophy of information (PI).

This raises the question: what would an SE grounded in PI look like? To explore this, I develop informational social epistemology (ISE), a framework that combines PI's emphasis on information as a foundational epistemic object with insights from Goldberg's (2021) research programme in SE. Goldberg's work focuses on understanding '*the epistemic significance of other minds*'. It examines how our relationships with other epistemic agents differ from our interactions with non-agentive features of our environment and explores the epistemological dimensions of our dependence on technology, both as a source of evidence and as a product of the epistemic labour of other people.

Goldberg notes that the nature of our dependence on others is fundamentally different to the nature of our dependence on technology. The former entails epistemic agency and responsibility, whereas the latter reflects a design-dependence, acknowledging that technologies are products of others' epistemic labour, with responsibility resting on their manufacturers and designers rather than the technologies themselves. In this paper, I challenge Goldberg's position by arguing that technologies can be viewed as artificial epistemic agents: accountable for their epistemic impact but not responsible, as they lack intentionality. Drawing on Floridi's (2013) discussion of artificial moral agents and moral responsibility, I contend that technologies such as algorithms and search engines impact epistemic environments in ways that justify holding them accountable.

Assigning accountability to these technologies has practical implications, necessitating their evaluation to ensure their outputs align with prevailing epistemic norms. To frame this accountability and provide a deeper understanding of the role of technology in supporting knowledge acquisition, I employ Floridi's network theory of account (NTA), which explains how technologies form part of integrated information flow networks that account for information, enabling it to be transformed into knowledge. NTA offers a powerful framework for engineering epistemic environments by highlighting the interconnected and systemic nature of knowledge.

In the final section, I explain the relevance of ISE to LIS by arguing that it offers a conceptual framework through which it can articulate its epistemic role within the broader architecture of the infosphere. LIS actively participates in shaping and organising epistemic systems by fostering environments where information is more likely to be successfully upgraded to knowledge. This perspective positions LIS as the engineering of epistemic environments, ensuring accountability, promoting good information-seeking and sharing practices and addressing the informational needs of epistemic communities.

The paper proceeds as follows: first, it outlines the theoretical foundations of ISE, drawing on key concepts from SE and PI to establish a framework that situates information as a central epistemic object. Next, it examines the epistemic role of technologies, arguing for their recognition as artificial epistemic agents accountable for their contributions to epistemic environments. Finally, it explores the implications of ISE for LIS, highlighting how the discipline can leverage its unique epistemic role to address contemporary challenges in engineering epistemic environments.

Background: social epistemology and philosophy of information

Social epistemology

Social epistemology (SE) explores the social dimensions of knowledge, including its production, acquisition, certification, storage and dissemination within society (Goldberg, 2021). While SE has roots in library and information science (LIS) – with Egan and Shera (1952, p. 132) defining it as '*the study of those processes by which society* as a whole *seeks to achieve a perceptive or understanding relation to the total environment—physical, psychological, and intellectual*' and noting its shift in focus from the individual to the social – it has mainly been developed outside of LIS in academic philosophy. Perhaps the most well-known foundation work in SE is Goldman's (1999) *Knowledge in a social world* (1999), which he describes as '*a philosopher's contribution to the shaping of an information-rich society*' (p. vii). Goldman describes two dimensions of SE: the social, which focuses on the role of interactions with other agents in knowledge acquisition, and the veritistic, which evaluates how social practices promote true beliefs and reduce ignorance or error. For Goldman, SE is not merely descriptive but normative – seeking not only to assess but improve socioepistemic practices across domains like science, education and law.

A further development in Goldman's SE is the systems-oriented approach (SYSOR SE) which widens the scope of epistemic assessment to include not only individual epistemic agents but also social epistemic systems. Social epistemic systems encompass '*social practices, procedures, institutions, and/or patterns of interpersonal influence that affect the epistemic outcomes of their members*' (Goldman and Whitcomb, 2011, p. 13). Examples of such systems include science, education, journalism and legal trials, all of which share a core mission: to enhance their community's possession of truth, information, knowledge or justified beliefs. As I have argued elsewhere, libraries and information services can be considered social epistemic systems, given their role in organising and disseminating knowledge to support individual and collective epistemic goals, and shaping epistemic outcomes through their intentional design (Dixon, forthcoming).

Goldberg (2021) builds on Goldman's work arguing that the core project of SE should be to characterise the epistemic significance of other minds. He highlights how our relations to other epistemic subjects differ fundamentally from our interactions with other features of our environment such as technologies. Other minds possess intentionality, are accountable for the knowledge they convey and enable epistemic practices such as testimony and collaborative inquiry. For Goldberg, these features make other minds central to understanding how knowledge is distributed and assessed in social contexts.

To articulate this, Goldberg introduces three concepts: epistemic subjects, epistemic agents and epistemic communities. Epistemic subjects are entities capable of being ascribed epistemic states such as knowledge or justified belief. Epistemic agents, meanwhile, are epistemic subjects considered in terms of their active roles in epistemic processes, such as acquiring, transmitting and evaluating information. Epistemic communities consist of the practices, institutions and norms that structure interactions among epistemic agents, shaping the flow of information and the collective nature of epistemic processes.

Goldberg outlines several ways in which our relations to other epistemic subjects differ from our relations to other items in our environment, such as technologies. First, epistemic subjects stand in epistemic dependency relations with one another within a shared epistemic community. Epistemic dependency arises when the assessment of one subject's belief depends on the role another subject has played in acquiring or sustaining that belief. For example, if one person relies on another's testimony or expertise, the evaluation of their belief involves considering the reliability and contribution of the other person.

Second, our interactions with other epistemic subjects are governed by norms that regulate our expectations of them as epistemic agents. These norms underwrite the expectations we hold regarding the reliability, expertise and responsibilities of others in their epistemic roles. For instance, we expect doctors to be knowledgeable about best practices in their field, or research team members to communicate developments that affect shared work. These norms can emerge from professional standards, explicit agreements or implicit practices developed through repeated interaction. Importantly, these expectations are normative rather than merely predictive; they reflect what we are entitled to expect based on the prevailing epistemic norms and practices.

Third, the epistemic assessment of beliefs formed through social routes – that is, beliefs shaped by epistemic dependence on others – is fundamentally different to the assessment of beliefs formed independently. When beliefs are socially formed, their assessment must account for the social practices, norms and epistemic environment in which they were produced. This includes evaluating the reliability of the individuals, practices, systems and norms that influence the production and sustainment of these beliefs.

Goldberg (2021) argues further that for SE to be fully adequate, it must also provide a detailed account of our epistemic practices that explains the social dimensions of knowledge creation and dissemination. This includes examining the roles played by individuals and institutions, such as acting as experts, certifying expertise, setting professional norms. Importantly, SE must also investigate the role of technology in epistemic pursuits, recognising that technologies are not neutral tools but the products of epistemic labour, embedded in practices and reliant on the expertise of others. Finally, SE must address the question of the proper unit of epistemic assessment and determine whether it should focus solely on individuals or extend to groups, institutions and technologies, to fully capture the social nature of our epistemic activities.

Based on their shared concern with information and knowledge, some have argued that SE should serve as a philosophical or conceptual foundation for LIS (Fallis, 2000, 2007, 2013; Budd, 2004). However, the philosopher Luciano Floridi has critiqued this view, suggesting instead that LIS and SE should be understood as sharing a common parent in the philosophy of information (PI) and are thus '*more like siblings*' (Floridi. 2002).

Philosophy of information

Philosophy of information (PI) is the area of philosophy concerned with the nature, properties and dynamics of information. Floridi identifies the need for PI in response to the emergence of the infosphere, which he defines as the '*the whole informational environment constituted by all informational entities, their properties, interactions, processes, and mutual relations*' (2016, p. 41). In simpler terms, the infosphere refers to the world we now live in, where the boundaries between the digital and physical have blurred, and the distinction between on and offline has become increasingly irrelevant. For Floridi, this transformation not only influences how we perceive the world, make decisions and interact with others but also prompts us to reconsider who we are and what it means to exist in an age dominated by information (for a more detailed introduction to PI and its implications for LIS see Van der Veer Martens (2015)).

In practice, PI involves the '*critical investigation of the conceptual nature and basic principles of information, including its dynamics, utilisation, and sciences*' (Floridi, 2002, p. 140). It examines issues such as what information is and how it connects to related concepts such as knowledge, truth and meaning. In Floridi's view, information has risen to the level of other fundamental philosophical categories, such as being, knowledge, life, intelligence, meaning and good/evil. As such, he argues that PI is essential for making sense of reality and society in the information age.

PI encompasses both metatheoretical and phenomenological dimensions. The phenomenological aspect of PI focuses on answering fundamental questions such as: what is the nature of information? And how does it transform into knowledge? (Floridi, 2011). It seeks to clarify how information exists, evolves and interacts with the world, particularly within the infosphere. This involves examining how information affects the way we think, live and connect with others in an increasingly digital world.

Central to the phenomenological aspect of PI is Floridi's definition of semantic information as well-formed, meaningful and truthful data. In this context, well-formed refers to the syntactical correctness of data – its adherence to the rules of a given system, such as grammar or coding standards. Meaningful indicates that the data conveys significance or relevance within a particular context, rather than being random or incoherent. Finally, truthfulness ensures that the data accurately represents the state of affairs in the world that it describes, excluding falsehoods. By requiring all three criteria, Floridi distinguishes semantic information from misinformation, which is meaningful but untruthful, and from raw data, which may be well-formed but lacks meaning.

Floridi's (2011) network theory of account (NTA) expands on this by explaining how semantic information upgrades to knowledge. Knowledge, according to Floridi, arises when semantic information is embedded within a network of explanatory relations capable of answering '*how-come*' (HC) questions, such as why or how a particular fact holds true. This integration ensures that information is not isolated but instead interconnected within an explanatory framework. For instance, the statement '*Berlin is the capital of Germany*' transitions to knowledge when it is integrated into a network that explains why Berlin holds this role, such as historical, political and geographical contexts. Isolated facts are insufficient for knowledge; they must form part of a network where each piece of information is meaningfully linked to others.

Floridi uses network theory to model this process, where nodes represent pieces of information, and edges represent the explanatory links connecting them. A piece of semantic information upgrades to knowledge when the network is structured to answer HC questions completely and accurately. This emphasis on structured explanation avoids problems such as epistemic luck, where information aligns with the truth by coincidence but lacks the necessary justification, or, as Floridi describes it, when '*semantic information lacks the necessary structure of relations that allow different packets of information to account for each other*' (Floridi, 2012, p. 444).

NTA bears some resemblance to formal approaches to SE that utilise network theory to explore the dynamics of epistemic communities. While Floridi's focus is on the transformation of semantic information into knowledge through explanatory integration in an information flow network, network theory in SE models how beliefs, evidence, and testimony are shared within groups (Goldman and O'Connor, 2021). For example, philosophers of science have used network models to analyse the division of cognitive labour in scientific communities (Zollman, 2007), the propagation of false beliefs (O'Connor and Weatherall, 2021), and the persistent citation of retracted papers (LaCroix et al., 2021).

The metatheoretical aspect of PI investigates the conceptual and methodological principles underpinning the study of information. Drawing on insights from computer science and information theory, it develops frameworks that address the foundational characteristics and dynamics of informational systems and processes. Central to this is Floridi's (2011) method of levels of abstraction (LoA), which provides a systematic way to analyse complex systems by breaking them down into manageable layers, each representing a different level of detail or focus.

At its core, the method revolves around two concepts: typed variables, which hold specific types of information, and observables, which combine these variables with a specific feature of the system being studied. A level of abstraction is the set of observables chosen to model a system, and

the resulting model represents the system at that level. This approach ensures clarity and precision, avoiding misunderstandings that arise from ambiguities in how systems are represented.

Floridi (2019, p. 20) illustrates this with the example of asking the price of a second-hand car. If someone answers '5000' without specifying the currency, the information is incomplete and potentially misleading. Such ambiguity, Floridi notes, can lead to significant errors – such as NASA's infamous loss of the $125 million Mars Climate Orbiter due to mismatched metric and imperial units between teams. Employing LoA enables you to avoid such issues by specifying and defining relevant variables to ensure that that important details are clearly articulated to minimise potential ambiguity.

While the concept of LoAs might seem similar to the *lens* metaphor used in the social sciences, Floridi (2021) criticises the idea of the lens for being often too vague and relativistic. In contrast, LoAs provide a clear and structured way to focus on the most relevant aspects of a system or object of study, isolating and defining its essential components. This precision makes LoAs an effective tool for analysis and modelling a system or object of study, ensuring that efforts are directed toward the most relevant aspects of a system or problem.

Developing informational social epistemology

Floridi (2002) rejects SE as a foundation for LIS, due to its epistemologically prescriptive nature and narrow focus on knowledge rather than information. He argued that information, understood as meaningful data, plays only a marginal role in SE. But is this an accurate assessment? Goldman's work, particularly *Knowledge in a social world* (1999), suggests otherwise. Goldman frames SE as an inquiry into what he terms the '*mental infosphere*', which encompasses all informational states – including beliefs, whether true or not. For Goldman, the goal of SE is to maximise the transformation of these informational states into true beliefs or knowledge, making information integral to the process. He highlights the importance of fostering an '*information-rich society*' and positions the understanding of information-sharing and -seeking processes within social contexts as fundamental to his framework.

Similarly, Goldberg (2021) treats information as foundational to epistemic practices. In his work, he introduces the concept of epistemic dependency, describing how individuals rely on others to supply, validate and assess information within a shared epistemic community. For Goldberg, the norms governing information-sharing are fundamental to structuring epistemic environments and enabling belief formation. Systems of information exchange are necessary to support the pursuit of truth and the creation of knowledge.

It could be argued that both Goldman and Goldberg treat information as only instrumental to achieving knowledge; however, even if this is the case, this role is far from marginal. Information is a key component of how epistemic processes operate. As Goldberg points out, reliable information and well-regulated sharing practices are indispensable to the proper functioning of epistemic environments. He highlights the importance of norms that govern information-sharing and epistemic dependency within communities, stating that such norms '*enable us to solve complicated coordination problems we face as we seek to acquire knowledge in communities that exhibit a highly differentiated division of intellectual labor*' (Goldberg, 2021, p. 29). This challenges Floridi's claim by suggesting that information is not marginal but in fact central to SE.

Given Floridi's assertion that SE and LIS are '*siblings*' sharing a common parent discipline in PI, it is worth considering how SE might evolve if grounded in PI. Such an approach would explicitly place information at the centre of epistemic inquiry, reshaping our understanding of its role in shaping epistemic environments and fostering collaboration between SE and LIS. This forms the basis for what I call informational social epistemology (ISE), a framework that bridges the theoretical insights of PI with the shared concerns of SE and LIS.

As explained above, Goldberg frames SE as the study of the epistemic significance of other minds and emphasises the need to understand the nature of our epistemic dependence on other individuals and technologies. Floridi's PI offers conceptual tools to refine SE's focus, prioritising an understanding of the informational dynamics within epistemic environments. ISE draws on Floridi's NTA, which reconceptualises knowledge as accounted-for semantic information embedded within a network of relations to an informational source. Semantic information – defined as well-formed, meaningful and true data – becomes knowledge when situated within a network capable of answering *how-come* questions that account for the semantic information. This network of accounts link sources of information to the propositions they support via intermediate nodes that structure explanatory connections. Epistemic success, therefore, depends on the network's ability to transform disconnected pieces of semantic information into an integrated system of knowledge.

ISE challenges the anthropocentric bias found in epistemology by extending the class of epistemic agents to include technologies. While Goldberg views technologies as tools that facilitate human epistemic practices, he stops short of granting them epistemic agency, arguing that only humans can be attributed responsibility. However, Floridi's (2013) discussion of artificial moral agents (AMAs), provides the basis for a parallel argument about artificial epistemic agents. Floridi argues that technologies can exhibit functional agency at certain levels of abstraction (LoA), independent of their lack of normative understanding. Adopting this approach, we can argue that ICTs can exhibit functional epistemic agency at an appropriate LoA, focusing on their contributions to knowledge production rather than their inability to act normatively.

By treating ICTs as epistemic agents, ISE provides a deeper understanding of their role in inquiry. Floridi argues that extending the class of agents, particularly to include artificial agents, allows us to conceptualise agency in a more inclusive and functional manner, tailored to the specific contexts in which these agents operate. This approach avoids anthropocentric biases by focusing on the behaviours and contributions of entities at appropriate LoA, rather than their resemblance to human agents. It enables a more precise analysis of the accountability and significance of technologies within epistemic networks, acknowledging their ability to organise, validate and disseminate information to support knowledge acquisition.

Floridi's concept of LoA allows us to evaluate artificial agents based on their context-specific properties. At a relevant LoA, artificial agents such as ICTs can be analysed for their epistemic contributions, including their reliability, outputs and the role the play as informational sources in epistemic networks. For example, while a magnetic strip holding a knife to a wall cannot meet the conditions of agency at any LoA, an AI system generating scientific insights can be recognised for its functional contributions within a defined epistemic framework (Floridi, 2013, p. 158). Floridi illustrates this distinction through the example of HAL in 2001: *a space odyssey*. HAL can be considered morally accountable – though not responsible or blameable – if it meets the conditions of agency, which include the ability to perform state-transitions and exhibit behaviours characteristic of agents within a given LoA, where state-transitions refer to the ability to move between different states, such as processing a command or executing an action, based on predefined rules and inputs. However, as Floridi notes, HAL would only be responsible and blameable in a science fiction scenario where it possessed a mental and intentional life (Floridi, 2013, p. 158). This example serves to demonstrate that accountability depends not on normative capacities but rather on the specific functional contributions an artificial agent makes within a given context.

There are several advantages to this approach. First, it recognises that agency is context-dependent, allowing ICTs to be considered agents within specific LoAs where they perform epistemic tasks. This avoids conflating agency with human-like qualities while acknowledging the distinct contributions of artificial agents. Second, it shifts the focus from responsibility – requiring

intentionality and understanding – to accountability, which is better suited to evaluating the functional roles of technologies. Finally, it highlights the role of ICTs as integral components of networks that facilitate the transformation of information into knowledge.

Importantly, ISE also addresses concerns about human responsibility within these systems. By extending the class of agents to include ICTs, it does not dilute human oversight but rather clarifies the distributed nature of epistemic accountability. This ensures that our dependencies on both human and artificial agents are evaluated within well-defined roles, fostering greater transparency and equity in epistemic practices. As Floridi argues, extending agency to artificial systems allows us to conceptualise accountability in ways that align with broader ethical principles, enabling technological mediation to support rather than undermine the functioning of epistemic systems (2013, pp. 157–158).

Objections and responses

While ISE offers a novel framework for understanding epistemic dependencies on both humans and technologies in informational environments, and the role of ICTs in inquiry, it is not without potential criticisms. This section addresses three significant objections to the approach: the reliance on Floridi's NTA and the epistemic role of ICTs in epistemic inquiry.

Objection 1: NTA is only one theory of knowledge among many and is not the most widely accepted

One possible critique is that Floridi's NTA represents a specific and perhaps contentious theory of knowledge. Social epistemologists often avoid committing to a particular theory of knowledge by speaking of knowledge in the weak sense as true beliefs. This objection challenges the adoption of NTA in ISE, suggesting that relying on NTA may alienate those who do not share Floridi's conception of knowledge.

Response

While NTA is not universally accepted, its strength in ISE lies in its explanatory power. As Illari et al. (2013) note, one of the strengths of NTA is its emphasis on integration, which reflects the reality that knowledge rarely exists in isolation but rather exists within interconnected systems of knowledge. Integration, in this context, refers to the way knowledge depends on and is supported by related propositions, forming a coherent explanatory network. This is especially evident in scientific knowledge, where understanding a single fact often requires situating it within a broader theoretical framework. This focus on integration aligns directly with the systemic and networked nature of modern epistemic environments which are heavily dependent on ICTs.

Additionally, NTA's flexibility in allowing for degrees of knowledge and its responsiveness to revisions makes it particularly valuable for analysing epistemic systems involving ICTs. Illari et al. (2013) further observe that NTA allows for differences in the extent of one's accounting network. For example, two individuals may both know a fact, but one may know it *better* by having a stronger network of explanatory connections, which may include access to ICTs that allow them to provide a better account of the semantic information they hold.

Floridi also points out NTA's sensitivity to changes in the accounting network, highlighting how it facilitates quick identification and correction of flaws in epistemic networks. He describes how significant epistemic shifts, such as a Copernican revolution, demonstrate the capacity for substantial revisions in accounting networks to reflect improved understandings. This makes NTA particularly effective for evaluating and improving epistemic practices in rapidly changing informational environments, such as those mediated by ICTs. Thus, even if NTA is not accepted as the definitive theory of knowledge, its utility as a framework for analysing knowledge processes in practice makes it a valuable contribution to ISE.

Objection 2: NTA does not fully account for tacit knowledge

A further objection to NTA concerns its limitations in accounting for tacit or procedural knowledge, a challenge highlighted in discussions of tacit knowledge, such as those by Polanyi (1958). Critics may argue that because NTA focuses on semantic information as well-formed, meaningful and truthful data, it primarily explains explicit or propositional knowledge – the kind that can be articulated, shared and embedded in information flow networks. However, many forms of expertise, particularly tacit knowledge, are embodied in practices and social interactions rather than in discrete statements.

If NTA is limited to explaining how explicit knowledge is structured, revised and corrected over time, then it risks overlooking how tacit knowledge is formed, transmitted and sustained within epistemic environments. This limitation raises the question: can NTA fully account for knowledge that is enacted through practice rather than expressed in propositional form?

Response

ISE extends NTA by recognising that epistemic environments are not just sources of explicit knowledge but also sites where tacit knowledge is developed, sustained and applied through social practices. To understand this, we can draw on Goldberg's (2021) concept of epistemically engineered environments (EEEs), which are partially constituted by these practices and help structure the ways in which knowledge – both explicit and tacit – is transmitted and applied. Tacit knowledge is an essential part of what makes EEEs function effectively, as they embed norms, expectations and expertise that shape epistemic engagement. Rather than treating tacit knowledge as an obstacle to be overcome, ISE explains how it operates within environments that foster learning, refine skills and guide epistemic participation.

Collins (2013) helps clarify this by distinguishing different forms of tacit knowledge. Relational tacit knowledge (RTK) remains unspoken due to social or contextual barriers but could, in principle, be made explicit. Somatic tacit knowledge (STK) is embodied and learned through experience, making it difficult to articulate in propositional terms. Collective tacit knowledge (CTK) is the strongest form, as it is not fully explicable but depends on immersion in shared practices and epistemic communities. This distinction highlights that knowledge is not always reducible to explicit propositions but is often enacted through engagement in shared epistemic practices.

ISE can also explain tacit knowledge through epistemic dependence, the idea that individuals rely on others – whether people, institutions or ICTs — to acquire and apply knowledge. A doctor diagnosing a patient, for example, does not simply recall medical facts in propositional form but draws on experience, pattern recognition and professional training that have become second nature. Their ability to make judgements is shaped by prior interaction with mentors, case studies and medical institutions that encode and refine expertise over time. Similarly, a researcher navigating a classification system may not need to articulate its theoretical underpinnings but is able to work with it effectively because of its design and conventions and the norms surrounding its use. In both cases, knowledge is not simply an individual possession, but something sustained through epistemic dependence on structured environments and expert communities.

Thus, while NTA focuses on explicit knowledge as a network of explanations, ISE extends this model by showing how epistemic environments incorporate tacit knowledge through epistemic dependence, habitual engagement and established norms that give rise to normative expectations. Since EEEs cannot function without tacit knowledge, it follows that tacit knowledge is, in a meaningful sense, accounted for by ISE. The ability to engage with an epistemic environment is not just a matter of acquiring propositional knowledge but about participating in a community where knowledge is applied, shared and built upon through collective inquiry and practice.

Objection 3: ICTs lack agency and therefore cannot contribute meaningfully to knowledge networks

Another objection targets the role of ICTs within ISE. Critics may argue that ICTs lack the intentionality and epistemic agency required to contribute to knowledge systems. Technologies like search engines or digital repositories are often seen as tools, not participants, in epistemic networks. This critique raises concerns about whether ISE improperly inflates the epistemic significance of ICTs, undermining the human-centric focus of traditional epistemology.

Response

ISE does not attribute traditional epistemic agency to ICTs. Instead, it positions ICTs as functional nodes within accountable networks that facilitate the flow, organisation and accountability of information, focusing on their functional role. Floridi's NTA provides the conceptual framework for this understanding. In NTA, knowledge arises from embedding information within accountable networks that answer *how-come* (HC) questions. ICTs play a crucial role in structuring and delivering this information, even if they lack intentionality or agency.

This perspective aligns with Goldberg's emphasis, discussed above, on the design-dependence involved in our epistemic dependence on technologies. Technologies are not independent epistemic agents but extensions of human-designed systems. For example, in academic libraries, ICTs such as catalogues and search engines organise and transmit information in ways that enable users to assess its relevance and reliability. Their epistemic value lies in their functionality within networks governed by norms of accountability and reliability.

Far from diminishing the role of humans, this view highlights the interplay between human agents and ICTs in epistemic environments. ICTs are indispensable for managing the scale and complexity of modern epistemic environments, but their epistemic significance depends on their integration into accountable systems designed and operated by human agents.

Engineering the infosphere: the relevance of ISE to LIS

ISE offers a conceptual framework through which LIS can articulate its epistemic role within the broader architecture of the infosphere. ISE, building on Floridi's philosophy of information (PI), conceptualises knowledge creation as a networked process, dependent on the interplay between human and technological agents. Within this framework, LIS is reconceived not as a discipline narrowly focused on the management of information, but as a discipline focused on engineering epistemic environments to ensure their proper functioning. This reframing highlights LIS's role in resolving erotetic deficits – gaps in knowledge – by creating and sustaining environments in which information can be successfully upgraded to knowledge.

ISE not only challenges the custodial metaphor traditionally associated with LIS but also critiques the more recent curatorial perspective shaped by Floridi's PI and its influence on scholars like Fyffe (2015) and Bawden and Robinson (2018). While LIS was historically framed as a custodial discipline responsible for preserving and maintaining recorded knowledge, Floridi (2002, 2004) proposed that LIS should be understood as applied PI, emphasising its role in stewarding semantic environments rather than being directly concerned with knowledge itself. This shift was later reinforced by Fyffe (2015) and Bawden and Robinson (2018), who framed LIS as '*curating the infosphere*' to foster semantic flourishing. The shift from custodial to curatorial does imply a slightly more active role for LIS; however, ISE argues that both custodianship and curation remain fundamentally passive roles, limiting LIS to the management of information rather than actively shaping epistemic environments to support knowledge creation. In contrast, ISE reframes LIS as a discipline focused on engineering epistemic environments that support the transformation of information into knowledge by facilitating its integration into information flow networks that allow it to be correctly accounted for.

This engineering perspective aligns with Floridi's (2019) proposed '*rebooting*' of philosophy as conceptual engineering or design. For Floridi, the task of philosophy is not merely to interpret the world but to model and refine the structures through which meaning is created and shared. Similarly, LIS's engineering of epistemic environments involves designing conceptual and practical infrastructures that facilitate knowledge acquisition and dissemination. This alignment demonstrates the philosophical and methodological significance of treating LIS as a discipline engaged in engineering, rather than simply curating, the infosphere.

Conclusion

This paper has proposed ISE as a conceptual framework that bridges PI and SE, offering a novel approach to understanding epistemic practices in contemporary knowledge systems. By integrating Goldberg's focus on epistemic dependence with Floridi's NTA, ISE repositions information as central to epistemic inquiry, challenging Floridi's characterisation of information as marginal in SE.

ISE frames the epistemic roles of humans and technologies within accountable networks, recognising the functional contributions of ICTs at specific LoAs. This framework moves beyond the anthropocentric assumptions of traditional epistemology, highlighting the interplay between human agents, technological tools and the epistemic systems they co-constitute. In doing so, ISE shifts LIS from a curatorial perspective to one of engineering epistemic environments, with a focus on creating and maintaining systems that enable information to be appropriately accounted for and transformed into knowledge.

Future research in ISE could explore the practical implications of this framework for LIS. These include addressing epistemic injustices, operationalising accountability in hybrid epistemic systems and further evaluating the considerations of extending epistemic agency to artificial agents such as ICTs. Furthermore, interdisciplinary collaborations between LIS, SE and PI could enhance ISE's theoretical foundation and provide practical solutions to challenges such identifying and diagnosing socioepistemic dysfunctions (e.g., misinformation and algorithmic bias) and understanding the role of artificial intelligence in knowledge production.

Finally, as Goldberg (2021) observes, a limitation of SE is its primary focus on the normative dimension of knowledge, often overlooking the empirical details of socioepistemic practices. Future research can also examine how LIS research (e.g., information behaviour, user experience, and information literacy) can inform ISE by providing insights into the empirical realities of how people engage with information in practice.

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