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RESEARCH ARTICLE

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Times new plural: The multiple temporalities of contemporary life and the infosphere

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Abstract

Experiences of time and temporalities in contemporary life are analysed, with Floridi's conception of the infosphere as a central concept. The effects of instantaneous communication and digital information are shown to result not simply in the obvious acceleration of many aspects of life, but in multiple temporalities. The informational spaces of Floridi's hyperhistorical time form a new time-based society, with our informational activities expressed in linear, cyclic, re-cyclic, and iterative processes. Examples from the information sciences, particularly information seeking and "slow information," are given, and an outline model for time literacy is presented.

1 | INTRODUCTION

"[T]he problem of time is inseparable from that of meaning. Time is the fundamental medium and condition of human meanings. It is the finitude of that element which is the ground of all existential quandaries" (Hoffman, 2009, p. 182).

This article examines time, and some of its implication for the information sciences. Time has been studied before from a specific LIS perspective; see, for example, Savolainen's analyses of time in information seeking (Savolainen, 2006, 2018), and the contributions to a special issue of *Journal of Documentation* on time and temporality (Haider et al., 2022). Older studies examined temporal factors in the context of information systems, and of organizational structures, themselves reflecting information communication (see, e.g., Clark, 1985; Lee, 1999; Lee & Liebenau, 1999, and references therein).

Here we examine specifically the experience of time and temporality, or multiple temporalities, within the contemporary phenomenon of immediacy and instantaneous communications enabled via Information and Communication Technologies (ICTs). We will suggest

that the *infosphere* (Floridi, 2010, 2014a, 2014b) is the most helpful concept for ICT-enabled, lived reality, and will consider time's part in the construction of the infosphere, and, equally, the infosphere's influence on the experience of time. Our analysis is rooted in the literature, but there are many experiences of, and perspectives on, time—so this analysis must be selective rather than comprehensive, and suggestive rather than conclusive.

Time is the subtext to all manner of current issues, developments, and day-to-day matters. It is a subject both simple (in our ongoing, conscious, everyday relationship with it) and deeply complex. If all human activity is embedded in time (Savolainen, 2006), and human activities can be considered to us as being both meaningful and informational, occurring in the *infosphere*, which is to say today's relational, informational reality (Floridi, 2014a), it follows that our personal and societal perceptions of time affect our activities, and society's time regime(s) affect our personal and social lived time and temporal experience, which is inherently informational. An increasingly complex and interconnected digital revolution is therefore, via the durational processes

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of ICTs and their influence upon our behaviors, a revolution in time and temporalities.

Today, it is common to feel rushed, wasting or losing time, between a present of intensified moments (Rosa, 2015) and a world running out of time (Baraitser, 2021, p. 2). However, contrasting thought, narratives, and experiences suggest a plurality of time and temporalities at work today, rather than a singular dominant notion. While ICTs have their part in everyday acceleration, the reality is more complex via this temporal variation and plurality, particularly now as information technologies permeate throughout all aspects of life in our ICT-dominated societies (for a thorough discussion, albeit dated in detail, see Gleick, 1999). A healthier perception of time would consciously acknowledge and aspire to integrate better the multitude of times both experienced and at our disposal, afforded by these new information technologies and our new information behaviors among them; the ability to do this, we refer to as time literacy.

In the following sections, we will explore some understandings of time, and then its relation to the infosphere. Our central argument will be that in polychronic *infospheric time*, human times must take their place among the multiple time affordances of media and technologies, and also the ecology of temporalities in and upon the Earth.

We will consider implications of time as related to information, and propose a model for “time literacy,” as a complement to other literacies of information; this latter will set out the knowledge of, and attitudes towards, temporal issues relating to information needed to act effectively in the infosphere. The arguments are simplified, as we do not, for reasons of space, distinguish between the potentially different temporal experiences of people grouped by gender, location, educational level, and so forth; this could well be examined in future studies, though some analysis of this nature can be found in Negrey (2012), Sharma (2014a), and Wajcman (2015). As the concepts are presented, we point forward to their relevance to the model presented later, with its components labeled A-G.

2 | THE NATURE OF TIME

Space does not permit treatment of the large amount of scholarship devoted to many dimensions of the concept of time (for overviews, see Hoffman, 2009; Ismael, 2021). Here we focus on the human experience of time, especially as affected by ICTs.

The process of modernism and modernization has been one of societal acceleration via industrialization to a recently intensified modernism, where processes and

consequences occur in a rapid and volatile manner, often detrimental to individuals, institutions, societal stability and the earth's resources. This has profound effects on our sense of time; the time of our own lives and the epoch within which we live, for individuals and for cultures (Rosa, 2015; Sharma, 2014a). Acceleration leads to a fragmented and intensified time, and modern secular societies fill the spiritual gap previously occupied by religion with the notion of a fulfilled life that makes the most of many options; invariably a *busy* life (Gleick, 1999; Rosa, 2015; Sutherland, 2019; Wajcman, 2015).

We find ourselves in a condition of *immediacy* that is enabled by the instantaneous transaction of data and information inherent to our ICTs (Tomlinson, 2007). Immediacy alters our perceptions and expectancies of how time passes in an individual and social manner, since we can communicate with a person on the opposite side of the world at the same speed and in essentially the same moment as that of someone in the same building. Immediacy also makes severe demands upon the work practices of both individuals and institutions as we are increasingly obliged to operate at any and all times (Görland, 2019; Rosa, 2015; Wajcman, 2015).

Our present modernity of immediacy is fueled by what has been termed *fast capitalism* (Tomlinson, 2007). In an infosphere which is permanently online, interconnected and mobile, networked ICTs allow instantaneous communications and so too financial transactions and market intelligence, inducing ever more hyperactivity and volatility, and an endemic short-termism. This influences wider society, with a knock-on effects for many people being an increased pace of change in work and domestic practices. With information online and available almost around the clock with our work and domestic lives blurred, and more traditional everyday roles and rituals turned to ongoing matters of synchronizing individual and household schedules, we have cause to feel harried (Wajcman, 2015). We are entangled in multiple, relational temporalities of our own as they come into contact with those of others (Sharma, 2014a); friends and family, work colleagues, service providers, fellow locals to our areas, other commuters, social media knowns and unknowns (aligned via algorithmic connections), and so forth.

Our day-to-day lives become more improvisatory, altered according to variable circumstances, events, options, limitations, and time running out. This leads to an episodic life of unconnected fragmentary experiences, full (busy) but perhaps insubstantial (Rosa, 2015), one lacking direction and even a greater narrative that we can build upon and return to (Han, 2017), as well as an erosion of concern with common societal progress (Rosa, 2015; Tomlinson, 2007). On a practical level, we

find ourselves constantly having to keep up, maintaining ourselves via ongoing *recalibration* (Sharma, 2014a).

Sharma's idea of recalibration, by which our experience of time is constantly reconsidered and revised to match our environment and social relations, has been developed and extended by others, notably by Coleman and Lyon (2023), who distinguish three modes of recalibration: *fissure*, with an awareness of an unimaginable future, *standby*, with an alertness to a changed future, and *reset*, with a radical reimagining of the future. This kind of analysis seems to have particular value in dealing with a rapidly and radically changing information environment, and informs components D and F of the model.

While we might assign blame to our smart devices and the always-on nature inherent to them and seemingly demanding of us, the reality is more complex (Keightley, 2012; Sharma, 2014a; Wajcman, 2015). New media devices offer us a plurality of times, as they themselves operate at temporalities de- and re-synchronizing online within the network. Indeed, modernism's acceleration and societal/global immediacy themselves create a plurality of tempos in which our activities take place (Prommer, 2019; Sharma, 2014a). We may combine media in the space of a moment, such as messaging while we watch TV, or social media scrolling while we listen to music; this intensifying the plurality of temporalities at play within that moment, in what can be seen as *polychronicity* (Prommer, 2019). These plural temporalities are of evident relevance to our dealing with information and documents (see, e.g., McKenzie & Davies, 2022); they are referenced in components C and D of the model.

Every form of communication is a temporal process (Sebald, 2020, p. 992), and with ICTs our relationship with time is heightened, as we inscribe them and they come to inscribe upon us; "a new shared moment of action in time; a vertiginous togetherness" (Keightley, 2012, p. 2). Our ICTs are essentially networked 24/7, and as they offer to save us time, we come to spend more and more time using them, and anticipating their use (Görlund, 2019; Haider & Sundin, 2021; Sebald, 2020). Virilio (1997, p. 33) wrote that instantaneous telecommunications would anchor us exclusively in the present, collapsing spatiality while cementing our sedentariness before the vertiginous screen of our transmissions; the "final void" of this vacuum (Virilio, 1997, p. 33). The infosphere however is far from a void, though its health and maturation require care through ethics and good governance (Floridi, 2010, 2014a), as reflected in component G of the model. We may better contemplate time both in the plurality and interconnectedness of our ICT-enabled temporalities, and the entanglement via domestic and social combinations or contrasts, rather than by individual experience (Sharma, 2014a; Wajcman, 2015).

The way ICTs affect temporalities has long been recognized (Lee, 1999) and given the centrality of ICTs in an infospheric information environment, these concerns are of clear significance to information science; they are related to components B and C of the model.

It has always been difficult to grasp an essence of time, to describe and explain it (Augustine, 397–398, in Groom, 2013; Ismael, 2021). We and our activities, specifically our information practices, are rooted in time (Savolainen, 2006), and affected by temporal issues, as witness such concerns as information overload, the attention economy, and attention distraction. These are all central concerns of information science, and are reflected in all components of the model, particularly A, E and F.

3 | TIME AND THE INFOSPHERE

The conception of the infosphere is based on the ideas that "what is real is informational and what is informational is real," and that "[t]he most obvious way in which ICTs are transforming the world into an infosphere concerns the transition from analogue to digital and then the ever-increasing growth of the informational spaces within which we spend more and more of our time" (Floridi, 2014a, p. 41). Informational spaces would include in-person meetings, physical libraries, social media environments, and online video calls, the binary distinction between analogue/physical and digital/virtual being now essentially irrelevant. And so we live *onlife*; the "always on" complex and motion-full analogue and digital mix of everyday life which is, again, not to say "plugged-in," *a la cyberspace*, but rather ICT-enabled and obliged as we go about our daily lives in the infosphere (Floridi, 2014a). These concepts are of central relevance to our view of the future of the information sciences (Bawden & Robinson, 2018), and to our conception of time literacy and inform all components of the model.

Floridi states that the development of ICTs has "outpaced our understanding of their conceptual nature and implications, while raising problems whose complexity and global dimensions are rapidly expanding, evolving, and becoming increasingly serious" (Floridi, 2010, p. 7). A subtext perhaps so obvious as to go unnoticed is that of time, and the ability of individuals and societies to enjoy the benefits of our ICTs and the infosphere at a pace that we as users, rather than that of innovative technological change, can live and work positively with. The infosphere increasingly synchronizes (temporally) as it delocalizes (spatially) (Floridi, 2014a, p. 48)—space "collapses" while time "aligns"—via ICTs with instantaneous global reach and data transfer. This provides us with two axes to help understand the changes being brought about, but time

itself is also radically altered in the infosphere, due to its contextual and local nature (Castells, 2010a).

Floridi considers our times today to be *Hyperhistorical* (Floridi, 2010, 2014a), and this term gives a sense of the social and technological climate that we perceive ourselves to be living within when we express the sense that life gets faster, that time only speeds up, that so much appears to be happening at the same time or in a relentless stream of events, and that we can access so much information so easily and immediately. Floridi argues that life in the infosphere absorbs much of energy and mental space, leading to a perceived need for speed above all else: “it’s getting harder for people to resist the temptation of speed first, direction next” (Lee, 2018). Preceding the *Hyperhistorical*, *Prehistory* denotes the age prior to widespread records and record-keeping systems, and *Historical* societies occur once these begin to be created, as history is our records of events (Floridi, 2010, p. 3). *Hyperhistorical* societies and environments are those “where ICTs and their data processing capabilities are the necessary condition for the maintenance and further development of societal welfare, personal well-being, as well as intellectual flourishing” (Floridi, 2017, p. 2). Although Floridi’s use of “hyper” in hyperhistory does not necessarily imply speed, as in, for example “hypersonic,” the widespread use of ICTs in a hyperhistorical society is inevitably associated with increased speed in all kinds of informational processes and transactions; and better associates with hyperactivity; the infosphere being a scenario of continual multitudinous informational activity and exchange. This is of fundamental importance for the ways in which information is created, accessed, and used, and is reflected in model components B, C and F.

Floridi’s infosphere can be described as a new form of time-based society, intensified along the lines of Rosa’s acceleration and Tomlinson’s immediacy, that has met both seasonal and industrial cycles with the escalating and simultaneous times of digital information transfer and instantaneous communications. The infosphere, as a concept of informational reality, includes all of these durations and temporalities. Floridi’s theories give definition to the unique experience of contemporary, ICT-based societies today, which is to say; *our times*. And the times we live in are populated by our experiences of—and activities in—time today.

We can view Floridi’s infosphere as where these multiple times great and small meet and take place, within the experience of onlife. The situation of onlife, and the *polychronicity* identified by Lee (1999), enforce Rosa’s intensification of any given moment (Rosa, 2015), itself sometimes exacerbating concerns of shortness of time (Prommer, 2019; Wajcman, 2015). To consciously consider reality as informational in an always-on societal

scenario is a shift that risks an automatic anxiety of exhaustion at the idea of having to be *absorbing* and *processing* at all times, and the phenomena of information overload (Bawden & Robinson, 2021). Prommer discusses *doing media*, which is to say our continual interactions with ICTs, and the tasks logistics involved with the use of them. All this at both the local and global level, as users roaming both physically and online and for whom this makes a contemporary sense, so much so that even to avoid media (or attempt to), is an information practice: “Doing media in a mediatised world means you cannot NOT do media; even if you avoid media or social media, you have to actively avoid media and actively not do media, so therefore, you still do media” (Prommer, 2019, p. 303). There is “a polychronic flow of [media] use” (Prommer, 2019, p. 302) which is as much a thing of interruptions and disruptions as anything else. It follows that we could describe the infosphere as a thing of temporal interruptions and disruptions as much as it might be a flowing informational ecosystem. However, despite the persuasive sense of a predominant and fast tempo inherent to modern life and so the infosphere, ICT’s “make possible new and multiple temporalities” (Wajcman, 2015, p. 9). While, as Wajcman argues, modern devices and media may not be solely responsible for causing time pressure, they certainly do not ease it (Görland, 2019, p. 325). The relevance of these concerns to the information sciences is clear, given the centrality of ICTs, and they are reflected in components B and C of the model.

Time and the temporal, in the infosphere, is operating and operated upon in varieties of—to use Sharma’s term—entangled ways that offer no easy reading or straightforward means of definition. What we might think of as “one’s own time” is, in many ways, via inter-mediated plural temporalities and onlife activities, co-dependent and co-created among the activities of others (Keightley, 2019). Again, we find parallels here in the conceptual rendering and experience of the informational and interconnected infosphere, as well as the obligation to keep up with the pace of change(s) both societally and in terms of personal ICT use.

Decelerations or other tempos to innovation are perfectly feasible in the ICT revolution, as “landing in the infosphere happens only once” (Floridi, 2018, p. 2), which is to say the infosphere is not reliant on acceleration in perpetuity. The radical innovation has occurred and can now alter pace (and/or include multiple and variable tempos), allowing social preference to take precedence.

The infosphere provides a route to comprehend our own both accelerated and time-plural daily lives, at the same time it almost coerces us to adopt a multitude of times and relational temporal experiences and coexistences in which we are both enabled and entangled.

4 | TEMPORALITIES OF THE INFOSPHERE

In plural time, polychronic and infospheric time, we come to understand that mastery of time can only go so far, when out of sync and negatively impacting on nature's time fabric, and that human time(s) must take their place among multiple temporalities and time affordances. The infosphere's challenge to humankind's "exceptional centrality" (Floridi, 2017) is key in this reorientation.

For Castells, temporal linearity is made obsolete when the speed of communications, information and data transfer is instantaneous, and therefore disrupts the sequential order necessary for linearity. Time disappears, becomes both ephemeral and eternal; *timeless* time. And this, he argues, is now our dominant temporal form (Castells, 2010a, p. 495).

Our forms of cultural expression, via ICTs and the network, comply with this new order as we can call upon the stuff of anywhere and all times to flavor today's mix (Castells, 2010a).

In this sense, the internet itself can be considered an art medium as much if not more than simply a carrier and disseminator of cultural works, that is, a medium of information (Groys, 2020, p. 32). And here, "in such a framework, our actions are recognised at last as polytemporal" (Latour, in Groom, 2013, p. 166). However, time continues to move on, irrespective of our having made it "disappear": "The individual is overwhelmed by the various temporalities he has to confront" (Castells, 2010a, pp. 472–473).

A perceived lack of orientation brought about in the combination of timelessness, endless demanding innovation, change and uncertainty, the breakdown or progressive narratives, and communal rituals (Han, 2017; Nowotny, 2019) is a concern to sociologists, philosophers, and polemicists. The infosphere may perhaps be considered as an analogy to Virilio's void, and to Han's hyperactive emptiness; caused via the loss of meaningful rituals and their structuring of time, and an endemic short-termism which sees us become disorientated "infomaniacs" (Fanjul, 2021). The infosphere is: "[...] growing in such a new liminal space [...]. [M]achine readable data, new forms of smart agency and onlife interactions are constantly evolving, because our technologies are perfectly fit to take advantage of such a new environment, often as the only real natives" (Floridi, 2018, p. 1).

Again, the implication here is that it is humans who need to adapt, among a plurality of informational entities, and so too a plurality of temporal regimes and freedoms. This is a deeply profound change, from the notion of time's arrow to one more like time's rain or hail. Within this intensification, human lives and identities

become fluid yet unstable (Han, 2017; Rosa, 2015), options and experiences are multiple, fleeting and stacked, distractions are inherent and ongoing.

Groys's concern chimes with that of Han and Rosa, while he seeks for a means to reconsider our very relationship with time and "[...] the phenomenon of unproductive, wasted time. However, one can also interpret this wasted time more positively, as excessive time—as time that attests to our life as pure being-in-time [...]" (Groys, 2010, p. 90). This is significant for the idea of time literacy, offering a nuanced view of time as an infospheric resource, rather than something to be "used" or "wasted."

While we understand that we and our activities are embedded *in* time, Groys poses the idea that we might prefer to view ourselves as being *with* time (Groys, 2010, p. 94). This is to collaborate with time rather than be swamped and swept by it. Floridi's infosphere speaks to an ecosystem-like reality of planetary activity, inherently informational and interconnected, and so collaborative. Here we exist *with* ICTs; the time-based technologies upon which so much of our contemporary life now not only depends, but via which it takes place.

While we have considered Sharma's recalibration as where and how we maintain ourselves within an entanglement of temporalities and an overarching power chronography, it is *de*-calibration where we find other, alternative and resistant temporalities (Sharma, 2014b), and so other informational environments and temporalities; "pockets of 'countertime'" (Hoffman, 2009, p. 163). The infosphere not only accommodates but can only be enriched by these pluralities of temporalities and approaches to living in and with time.

Indeed, we see something akin to trends of time that appear and gain exposure, such as the "slow" movement, which tends to prioritize the quality of produce (e.g., slow food) or the appropriate pace for a certain activity (e.g., slow travel), or the concept of "time millionaires," who prioritize the saving and wealth of time over that of money. Here and elsewhere, we are reminded that time is not something to which we have equal access or affordances (Sharma, 2014a, p. 133). This is reflected in some of the specific concerns about temporal issues in studies of information access and behavior (Haider et al., 2022), and particularly in an interest in "slow" information/scholarship/librarianship/and so forth as an antidote to the perceived damaging increase in the speed of all information process (see, e.g., Poirier & Robinson, 2013; Berg & Seeber, 2016; Beene & Thompson, 2022). This is reflected in components C, D and F of the outline model.

Marshall McLuhan had already foreseen that the acceleration within new media technologies would create multiple tempos which allow greater affordances to perceive the

environment (McLuhan, 1968; Sutherland, 2018, p. 15), and Floridi's infosphere provides an example, indeed a realization, of this. Rosa followed his work on acceleration with a theory of resonance and resonant experience, which acts as counter to the alienation brought about by the fragmentation and subsequent estrangement within accelerating modernization (Rosa, 2020). There is an interesting relation here to Ruthven's (2021) exploration of resonance in the wider information science context.

The repetition of activities, such as domestic chores, work practices, leisure, and learning processes, offers both every day and ongoing reassurance and ritual, maintaining and nourishing a core of predictable order and manageable variation in our lives (Gorichanaz, 2021). Meanwhile, resonant are the transformative experiences found in such things as a relationship with another person, the encounter with an artwork (of any kind), an experience of nature, and so on; things that cause some shift and alteration in oneself. Of course, the examples are many, variable and subjective. In the information context, a good example is the study by Rothbauer and Cedeira Serantes (2021) of the temporal experiences of reading. In this sense, resonance is impossible to predict in any real way, should not be mistaken for necessarily harmonious and unifying, and is transformative due to the element of difference—even contradiction and/or opposition—that causes the resonance (Rosa, 2018). Resonance is an active connection which leads to both self and world-transformation, possesses a “non-disposability and moment-like character” (Rosa, 2018), and while requiring a certain stability from which to be open to it, compels a genuinely dynamic and relational exchange. Why is resonance of interest to us here, where our concern is the time and temporalities of information? First, because Rosa's resonant experiences are informational; educational and transformative, but are also exchanges with other informational entities (other people, artworks, nature, etc.). And Rosa argues that societal acceleration and time pressure work against the possibility of resonance, and so the greater possibility of living a good and vibrant life (Rosa, 2018). The idea of resonance is related most closely to component C in the model.

We now examine some aspects of temporality of relevance to the information sciences, whose role has been expressed as curation of the infosphere (Bawden & Robinson, 2018).

5 | TIME AND THE INFORMATION DISCIPLINES

Time, while essentially unseen, “helps us make sense of the world and our social lives” (Haider et al., 2022, p. 2).

As Hoffman (2009, p. 182) points out, time is inextricably associated with meaning, and “problems of information are frequently formulated as problems of time, and vice versa” (Haider et al., 2022, p. 3).

Information, and hence knowledge, is time-based in terms of its ongoing process of creation, its accrual, and availability. We experience meaning not only in temporal events but also documents, which is to say “the human record”; the primary concern for the information sciences (Bawden & Robinson, 2022, pp. 1–4). This necessitates concern upon humans' ability to produce, experience, and maintain our records. Time and temporal issues are fundamental here.

Information seeking and absorption are temporal processes and actions dependent on time's availability and, perhaps more often, its constraints, with time affordances being subjective according to the differing “time horizons” of information seekers (Savolainen, 2006, p. 116). These temporal processes are complex, involving linear, cyclical, re-cyclical, and iterative processes (Savolainen, 2018).

Information seeking involves not only information resources but also the focus conducive to that seeking which often demands more than partial (or distracted) attention. If we feel pressed for time, we may settle for information of less real relevance, depth or quality, discarding information that might require greater time and attention (Savolainen, 2006, p. 118). Indeed, this may be a perfectly natural reaction not only due to time constraints but today where information glut is more or less the norm (Bawden & Robinson, 2021). The information seeker may also require assistance, calling upon the temporal availability within other work-flows of information professionals whose work practices have fragmented and intensified along the general societal and institutional lines (Nicholson, 2019). As with other sectors, the activities of information services are obliged to speed up, keep pace, update where necessary (i.e., continuously); challenging both the ongoing work of research and the management of libraries, collections, and archives that often requires the appropriate pace(s) and rhythm(s). As information workers and services are themselves embedded within social and knowledge networks, they are not immune from a dominant tempo of speed and immediacy, and the need to recalibrate (Nicholson, 2019). Traditional spaces such as libraries and archives have had to adapt to societal expectations of what we might call fast information; immediate, 24/7 access to at least digitally available resources engendered by the search engine at the fingertips of anyone with a smart device. Libraries are inherently time-plural; as the spaces themselves together with the collection of information resources and activities offer and induce varying and variable temporal experiences. Here, “different times accumulate, since

many possible times are present in one place” (Deckner, 2019, p. 95).

As an example of the different times of information, and an alternative to the general speeding up of information process, we can mention the concepts of *slow information*, the search for more appropriate tempos of information seeking and consumption (Poirier & Robinson, 2013), and of *slow looking*, the gathering of information through sustained observation and deep enquiry (Beene & Thompson, 2022).

Reading itself today, in online and physical formats, in text-heavy communications and media, from instant messaging to newspaper articles, list recommendations, meme quotations, goes far beyond the book as model: “The intriguing temporal quality of reading is that it fits into daily routines and rhythms, but at the same time, it can be a revolt against temporal regimes. Reading in this register is about escaping time, or resisting the pressures of clock time—it is about making time” (Rothbauer & Cedeira Serantes, 2021, p. 121).

Reading “destabilizes time” even as, for the reader, it may well provide reassurance and stability within spaces of the day (Rothbauer & Cedeira Serantes, 2021, p. 119). So even the act of reading and absorption of information contains contrasts and paradoxes, even before we consider the intensification and new media environments of today’s plural times.

Concepts of documents and resources themselves radically change in the infosphere as ever-increasing amounts of information are accumulated by publics interacting and producing daily to a degree previously unthinkable. This “content” exists in often barely-ordered collections of postings, files, shared photos, existing in clouds and the memory of any number of devices. Here we find “multitudes of variously enduring and interconnected, personalised, ‘archives’ of past events, imbued in constructions of the present” (Haider et al., 2022, p. 5).

An accelerated infosphere treads the fine line between increased access to more and good quality information, and hence learning, life options and betterment for humanity (Floridi, 2014b), and flip sides of both information overload and information poverty where access, infrastructure and literacy is lesser or unaffordable (Bawden & Robinson, 2022, pp. 222–325). Here, “misinformation or disinformation seem to thrive” (Haider et al., 2022, p. 8).

External events within uncertain and disruptive times have influence on our sense of time and what lies ahead, and this can “quickly alter modes, speed, and forms of data production and use” (Haider et al., 2022, p. 13), so that information services must become aware of, assess, include to greater or lesser degree, updating accordingly. The nature of the internet itself, upon which ICT’s

operate and connect, is one of data in states of emergence, submersion, disappearance, and modification (Groys, 2020, p. 37). Online publications are rarely today standalone entities that can be preserved without the interconnection involved; from internal links to other sites (that may or may not remain active), to reader-comment threads, requiring time for participation.

When Rosa writes that “[t]he faster things change, the less it is worth the effort of becoming intimately familiar with them” (Rosa, 2015, p. 318), this has many implications. Of interest here is how this means not really understanding, or caring, *how* our ICTs work, or how and at what cost they are manufactured; just needing them *to* work. The more our records are housed upon and created by ICTs (both hardware and software, and energy-reliant) the more dependent we are upon them to work and continue to work, despite the cycle of obsolescence and updating inherent to technological innovation that locks us into obligatory consumption of a scale far beyond that of the production and collection of printed materials. Again, these are temporal issues stemming from the time scenarios of contemporary ICT-enabled life.

Floridi’s sets out the questions of infospheric progress thus: “What seems to be lacking, in affluent societies, is the fundamental engagement with the human project [...]. It is as if, having worked hard to gain the right to be on vacation, humanity might then be uncritically unprepared to make the most of its most precious resource, time. Technologies are used to save time first, and then to kill it. So one of the pressing political questions that we are facing in advance information societies is: what sort of human project are we working on?” (Floridi, 2014b, p. 22).

The infosphere directly affects human perceptions of time, and indeed of personal identity: “ICTs increase the endurance effect, for in digital environments exactly the same self may be identified and re-identified through time. [The virtual] does not grow old; it outdates, it does not age. On the contrary, the self ages ... The effect, which we have only started to experience, and with which we are still learning to cope, is a chronological misalignment between the self and its online habitat ... Until recently, the optimistic view was that ICTs empowered individuals in their personal identity DIY. The future is more nuanced. Recorded memories tend to freeze the nature of their subject. The more memories we accumulate and externalize, the more narrative constraints we provide for the construction and development of personal identities. Increasing our memories also means decreasing the degree of freedom we might enjoy in defining ourselves” (Floridi, 2013, pp. 222–223). Since in this perspective we are informational entities, and our identity is defined by our information. these issues are both wholly temporal and wholly informational.

In practical terms of information services, obliged to constantly update, we might again ask what lingers and holds? To paraphrase Sutherland, what can the information disciplines *retrieve into the present*? Surely our duty is “those truths (so to speak) that would be drowned in the fast-moving stream of experience” (Sutherland, 2018, p. 19)?

We now move to use these considerations to outline a provisional idea of *time literacy*, as a subset of the broader concept of information, or digital, literacy.

6 | TIME LITERACY

Above, we have discussed various concerns and intersections between information and time. We will now consider an outlined, provisional “time literacy,” including as its components the concepts discussed above. This takes as its departure point the commonly understood bases of information, digital, and media literacies (Bawden & Robinson, 2022, pp. 333–339), within which various temporal issues can be identified. In the same way that these literacies have gone beyond formal educational settings to be recognized as of general benefit to contemporary life and society (Bawden & Robinson, 2022, p. 339), so might a time literacy. When we understand our times to be plural, where temporal factors can be multiple, overwhelming and contradictory, affecting both individual and social progress and wellbeing, such a literacy is surely necessary.

Time literacy may sound as if leaning towards lifestyle coaching and the traditional business concept of *time management* (see, e.g., Forsyth, 2022), but if deployed from within information literacy a distinctive value becomes clear. The inherent temporal factors of information, ICTs and our lives among them are of growing significance, and so it follows that information literacies contain subtexts of time concerns worthy of greater consideration (Haider & Sundin, 2021, p. 130).

Time pressure and anxiety impacts upon not only individuals but also information services and creative practices. Multiple temporalities allow access to the stuff of the infosphere at whatever time is convenient, while at the same time a sequential temporality necessary for sense and meaning-making is challenged. A plurality of times offers the potential of alternative, autonomous, and even resistant temporal approaches and experiences. Repetition and resonance may provide breathing spaces within the concerning sense of time passing. All these factors call for a new literacy of information and time.

A critical literacy not only assists people to act within dominant norms as they appear in societal structures but should also include contextualization, as well as alternatives and resistances to those where they involve bias, injustice and/or ignorance of diversity (Haider &

Sundin, 2021, p. 131; Haider et al., 2022, p. 11). Therefore, a time literacy would equip individuals and groups with a survey of time concepts from the dominant (e.g., speed and immediacy) to those such as the time pressure paradox of Wajcman, the temporal entanglement of Sharma, and the ecological, glacial time-scapes of Castells, and others such as Bensaude-Vincent (2021).

Time-scapes and pluralities, affordances, and entanglement might appear as key to understanding a decentering, along the lines of Floridi's infospheric decentering of humans, of a preoccupation with one's own time and in particular one's “free time,” and an opening-up to time as lived; interconnected with others and in plural time frames from the everyday to the glacial. The common concern would be; how can we understand and make best use of a plurality of time affordances while navigating a plurality of temporal limitations, complexities, and paradoxes?

A specific time literacy component in information literacy could contribute to enjoyment and to spiritual development, as well to educational and professional activities (see, e.g., Kari, 2007; Walsh, 2020). One can imagine various playful and studious activities that call upon both personal experience and the observation of time's workings in the lives of others and societal, political, media, and natural processes, to name but a few. Outlooks towards fragile and troubling futures could be examined, and time-related contributions within positive action and coping strategies explored. In this way, a playful approach may provide some antidote to the negative aspects of infospheric time.

A provisional model for time literacy, intended to provoke thought rather than to set out a rigid framework, is presented below, showing how the temporal concepts introduced above are included, the alphabetic labels for the components being those used in the earlier discussion. Although the components could form a distinct “time literacy,” they would better be added into a broader model of information, digital, or media literacy, in a manner analogous to an infosphere-based model for privacy literacy (Bawden & Robinson, 2020). While applicable in principle to any model, they are most appropriate for a metaliteracy formulation, because of its inclusive and nonlinear nature.

The components of the model are as follows:

- Understanding of time and temporalities as a key factor in contemporary life [A]: Underpinning temporal literacy, this general understanding enables an informed approach to issues of time in the infosphere.
- Knowledge of the nature of ICT resources as engendering multitemporal actions and experiences [B]: This more specific knowledge enables an informed approach

to the adoption of ICTs, from the specific perspective of their effect of the experience of time, with emphasis on polychronicity.

- Awareness of temporal difference, plurality, and resonance in ICT activities [C]: This awareness allows effective use to be made of specific ICTs and media, identifying and avoiding negative temporal effects.
- Awareness of temporal difference and plurality in social activities and obligations [D]: This awareness allows effective participation in the infosphere generally, again avoiding negative temporal effects, with emphasis on recalibration.
- Awareness of personal and community time resources [E]: This awareness allows time (or, better, times) to be effectively used as a resource, specifically in the handling and communication of information, avoiding problems such as distraction and overload.
- Independent learning and temporal navigation [F]: This attitude adapts the positive attitude to independent learning fostered in several models of information literacy and multiliteracy, by specifically including the right use of time.
- Moral literacy with an awareness of time-scapes [G]: This attitude adapts the “right use of information” component of information literacy models to include a specifically temporal perspective on the ethics of the infosphere.

This model, provisional though it is, may serve two purposes. As a conceptual provocation, it may promote a different view of temporal issues in scholarship and research in the information sciences, particularly perhaps where allegedly intelligent systems allow an increasingly rapid discovery and presentation of information. Concepts of recalibration may be a particularly useful theoretical lens to examine changing information practices.

As an aid to practice, these temporal concepts may be included in models of information behavior and information literacy. This would best be done by inclusion in, and extension of, existing models, rather than creating new and solely temporal models; the model presented here is intended as an aid to that rather than an end in itself. This is analogous to the suggested inclusion of privacy concepts in models of information behavior and literacy (Bawden & Robinson, 2020).

7 | CONCLUSIONS

Despite variations of thought and concept, the literature tends to agree upon experiences of time and temporalities as being plural today, this enabled (intentionally or otherwise) by an overarching dominance—both general and

assumed—of speed, acceleration, and immediacy. This speed is to be found in the scenarios of contemporary capitalism, but also work and leisure practices, individual and social habits, despite the affordances of technologies that are intended to save time. These factors cause the disruption of previous time norms, with profound affect upon us. While we may hold to ideas of clock time and our living by them, we are rather living among variable combinations of temporalities as found in, but not limited to, instantaneous technological communications and transactions, 24/7 news cycles, and ecological time-scapes.

The instantaneous time of communications and data transfer, and the glacial time of nature responding to our modernity are both, in their own ephemeral and eternal manners, tempos which support us today, via the transaction and infrastructure of the former, and the fundamental life-support of the latter. We have seen, via our reading of the infosphere as comprised of all manner of informational entities, that humans are not central, and this enables us to better understand that time is not centered on us and the tempo(s) “we” choose. It surely never was, but ICTs and the environmental crisis bring this into stark relief as we simultaneously chase the time affordances and obligations of ICTs, and are forced to anticipate and attempt to slow the time of extreme, accelerating ecological breakdown, which will in turn alter temporal experience (to say the least).

While the “time pressure paradox” is real, so too is the felt sense that time is speeding past or it does not flow as we would wish it to, and that we imagine we are running out of time in both personal terms and societal, indeed planetary, terms. Technology, innovation, and the pace of events appears fast and disorienting, but that of progress is slow and endangering.

There may be no achievable, all-encompassing relationship we can have with time, as it proves itself to be plural, and both we and time(s) change. And how could there be, in times we know to be uncertain and precarious, with a future so in question? Rather, a propositional time-literacy, as outlined above, might equip us with conscious thought, approaches and tactics for living within and among the time(s) of the infosphere.

Time is of increasing significance in our lives, as we come to understand better our inherently time-based societies and informational activities. While a multitude of times can be overwhelming, it is also an opportunity to live according to the plural times at work within the infosphere and among ecological time-scapes. As we see in ecologies and natural systems, diversity is necessary for health, and health is necessary for vibrancy. We understand this in terms of information via the infosphere. And perhaps we are healthier with a plurality of times to

work with, rather than a single, mechanical clock time by which we fall in line?

This makes demands on ourselves and our information services, as we attempt to keep up with developments. Among issues of direction, linearity and the sequential, we find profound anxieties. However, the trade-off taking place is to a set of options and variables that perhaps bring us in touch with not only the ephemeral but also eternal dimensions of time. McLuhan posited this as return to a mythic time (McLuhan, 1968), and believed that “within any media environment, we can find the tools to emancipate ourselves from its grip upon our thoughts and perception” (Sutherland, 2018, p. 14), to which Wajcman would surely agree.

Ultimately, of course, times change, and will continue to, rife as they are with anxiety and potential: “The collapse of time into a series of depthless presents and the alienation that is oftentimes considered as a result of it is far from being a done deal” (Keightley, 2012, pp. 20–21).

Although seemingly paradoxical, this complex and entangled set of temporal variables in contemporary infosphere life offers us the chance to confirm McLuhan’s notion of “electric or ecological man (man of the total field)” (McLuhan, 1968, p. 156). This challenge and call to sense-making evokes Deleuze and Guattari’s reading of J. M. W. Turner’s intensifying painterly abstraction: “[e]verything becomes mixed and confused, and it is here that the breakthrough—not the breakdown—occurs” (Deleuze and Guattari, 1983, p. 132). Such abstract and theoretical considerations may seem remote from the concerns of the information disciplines and professions, but this is not so. Confronting and analyzing the temporal complexities of the infosphere can benefit both research and practice in changing times.

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