Digital Preservation

Notes on Theory, Practice, and Agenda

Version 1.0 – November 2026

Extracts from a sub-sub-librarian

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These notes offer opinionated reflections regarding a working theory and research agenda for the digital preservation enterprise. They begin by establishing a core set of self-evident axioms, corollaries, definitions, and desiderata that constitute a coherent theoretical and pragmatic framework for digital preservation ideation and action.

Metaphor, Theory, Model, Method

As both discipline and profession, digital preservation doesn't have a well-formalized or widely-accepted foundational theory. While the enterprise does conform to an underlying model, that model is based on an inadequate metaphor. Why is that important? Because conceptual metaphor inherently, and most-often tacitly, conditions the individual, institutional, and social bases of perception, cognition, and action, implicitly setting boundaries on what is considered legitimate – and even imaginable – inquiry and effort (Lakoff & Johnson, 1980; Becker, 2018): "Those [phenomena as understood by 'normal' science] that do not fit the box are often not seen at all" (Kuhn, 1970, p. 24). Limited metaphor leads to constrained theory and model, and consequently, inhibited programmatic plans, activities, and outcomes.

Mainstream thinking about the digital preservation enterprise still views it primarily as an exercise in technocratic data *management* (Bak, 2016), particularly as codified in practice by the OAIS reference model (ISO, 2025b). This is not wrong – data management necessarily sits at the core of the endeavor – but it is also not fully right. As suggested below, digital preservation is more properly conceived of as an ongoing process of technically-mediated but ultimately humanistic informative *communication* unfolding across time. This may appear to be an inconsequential nuance, but the perspectival shift in fundamental metaphor has profound conceptual as well as pragmatic implications.

Undue programmatic emphasis on the necessary enabling managerial *instrumentality* of preservation comes at the expense of properly embracing its (aspiringly) sufficient enabled *teleology*. A communicological approach embraces the full spectrum of preservation necessity *and* sufficiency, process *and* goal, means *and* ends. Fully understanding the *why* and *for whom* of preservation leads organically – and more comprehensively – to the proper *what*, and subsequently, the most effective, productive, and sustainable *how*, *when*, *where*, and *by whom* of the enterprise.

In consequence, these notes follow a general abductive pattern of progressive refinement:

Metaphor → *Theory* → *Model* → *Method*

While deductive analysis results in logically-*necessary* conclusions and inductive investigation in statistically-*most-likely* justifications, abductive inquiry leads to pragmatically-*most-plausible* consequences (Reichertz, 2014), that is, the "inference to the best explanation" (Psillos, 2002). Abductive inquiry is purposefully open-ended rather than bounded, exploratory rather than (pre-)directed, and guided equally by experience, reason, intuition, and imagination.

The communicative metaphor asserts an essential complementarity between preservation and usage, the former encapsulating informative concerns *across* time and the latter at a *point* in time. An analogous relationship inheres between theory and practice, respectively focused on meaningful understanding as evolved *over* time and applied *in* time. These twin dichotomies, or rather, continuums of exploration and action, form the principled landscape for these reflections. The results of this exercise are encapsulated in illustrative "maps" of relevant preservation theory (see Table 5-1) and practice (Table 6-1), with a summary of controlling principles and recommendations presented in Section § 8.

1 Preliminaries

What is the nature of the informative world?

1.1 AXIOM

Information is an ineluctable component of reality distinct from matter and energy
(Stonier, 1996; Crnkovic, 2012)

Despite its fundamental metaphysical importance, broad agreement regarding the proper definition of information remains elusive in scholarship and practice; see for example (Capurro & Hjørland, 2003; Floridi, 2004; Bates, 2006). For purposes of these notes, general acknowledgment that there is some such thing as information at all is more important than any specific delineation of what it is (or isn't). However, in order to provide some common frame of reference, information is (very) lightly imputed to be a matter of pragmatics.

1.1.1 DEFINITION

Information is a difference that makes a difference
(Feigl, 1949; Bateson, 1972)

From the pragmatic perspective, first, there must be something that is *differentiable*; second, that thing must be pertinent to an incumbent agential *purpose*, whether intentional or serendipitous. Thus, the gist of this definition alludes to information's susceptibility to being perceptually *represented* (a difference *of what*?), that is, something that has been "put *in formation* [emphasis in original]" (Mullaney, 2026), and implies an information-consuming agency that *interprets* and *reacts to* the information in a contextually-meaningful way (a difference *to whom*, in what *situation*, and with what *effect*?).

1.1.2 COROLLARY

Information content is distinct from its carrier

The map is not the territory (Korzybski, 1933), the *signifiant* [signifier] is not the *signifié* [signified] (Saussure, 1916/1983), and the FRBR-esque manifestation is not the work (q.v. Coyle, 2022). Buckland (1991) distinguishes between information-as-*thing*, that is, the representation carrying the content; information-as-*process*, the means through which that representation is projected and consumed; and information-as-*knowledge*, the decisive informative change of cognitive, affective, or conative state of the informed consumer.

The aspects of transmissive process and transmitted knowledge emphasize that information is inherently a form of storytelling. Whether imaginative grand epic or mundane factual recital, information embodies a persuasive psycho-cognitive narrative, an argument trying to convince us about something pertinent to ourselves and our world.

1.2 AXIOM

Informative reality is experienced idiosyncratically through an interplay of externally-focused perception and internally-reflective cognition and affection
(q.v. Davidson, 2001)

Not all differences are the same. Informative meaning *emerges from*, rather than objectively *inheres to*, its information-laden carrier. While that carrier, i.e., the information's representation, has an objective solidity, the carried content – or more properly, the *interpretation* of that content – does not, but rather, possesses an inherent fluidity. With no direct, non-mediated access to external reality, our knowledge of the world, and others who inhabit it, is provisional at best; only our own thoughts can be known unconditionally (Descartes, 1637; Avramides, 2023). While we are each the final arbiter of our own conclusions, we are inherently social beings. As such, our understandings, intentions, and actions are inevitably informed, to some greater or lesser degree, by social convention, prescription, and proscription (Mingers, 1995). Thus, all experiential acts of information consumption are inherently intersubjective, contingent on acculturated time, place, person, and purpose (Abrams, 2025b).

In vernacular usage, *objectivity* often connotes a sense of absolute conviction of what is (or is not) the case, and *subjectivity*, an arbitrary, if not capricious, assumption of fact. However, these terms are used hereinafter in a more formal technical sense to refer to that which is the external *object* of sensory perception and that which is the result of a perceiving *subject's* individual internal cognition. The socially embeddedness of any such subject makes the process of cognition intersubjective.

1.2.1 COROLLARY

Any unit of abstract information may have many alternative representations instigating (roughly) equivalent cognitive understanding, affective sentiment, or conative action

Different differences *may* be the same. The consumption of information is susceptible to an inherent phenomenological metamerism, akin to the way distinct optical stimuli can instigate equivalent color perception and experience (Akbarinia & Gegenfurtner, 2018).

Any given informative representation is, relatively-speaking, of only transitory importance, possibly being just one of many convenient but arbitrarily-selected or fabricated alternatives (Buckland, 1991). Preservation imperatives properly focus on ensuring legitimate experiences of persistent underlying informative content, whether based on the originally-accessioned representation or some subsequent derivative.

1.2.2 COROLLARY

Intersubjective informative experience is not reducible solely to the totality of the perceived and cognated properties of external information-laden objects

While deeply and inextricably informed by perception of the external world, internal human experience always transcends the objective, no matter how comprehensively descriptive and informatively crystalline. "Facts are theory-laden; theories are value-laden; values are history-laden" (Haraway, 1981, p. 477), and history inherently positions each of us in our own contingent and idiosyncratic accultured context. The language of experience "is never a neutral tool by which we represent the world: every word and phrase carries with it a tangle of cultural assumptions and connotations.... Form is not entirely distinct from meaning, and aesthetics are always entangled with values" (Wilson, 2026, p. 3). Thus, preservation is not (solely) a science or engineering activity, but also encompasses an art and craft. It is technically-facilitated but critically reliant on scholarly, pragmatic, and intuitive human understanding and decision-making

2 Basics

What is the nature of the preservation impulse?

2.1 AXIOM

Information is critical to the foundation and working of human culture. That culture flourishes when information flourishes, and endures when information endures
(q.v. Foote, 1990; Ursul, 2018; Lanagan, 2025)

Descartes's *cogito* (1637) is the internal locus of informative meaning-making arising within an external information-laden environment.

2.1.1 COROLLARY

Information is a necessary but intermediate step towards culturally-productive knowledge
(q.v. Zins, 2007)

Cultural flourishing is dependent on the *application* of information to illuminate knowledge as justified true belief (q.v. Losee, 2014) to counteract the Gresham's Law-like (Emblemsvåg & Emblemsvåg, 2023) tendency of dis- and misinformation to overwhelm "good" information with pernicious psychological and social effect (q.v. Baumeister et al., 2001; Bawden & Robinson, 2008).

2.1.2 DESIDERATUM

Complement preserved information with the means for critical interrogation and confirmation

Because information never exists in an interpretive vacuum, the fullest possible understanding of informative cultural context is crucial to justifying beneficial knowledge. "An age is called Dark not because the light fails to shine, but because people refuse to see it" (Michener, 1985).

2.1.3 DEFINITION

Preservation is the affirmative socio-technic endeavor ensuring the informational continuity of precious human memory and experience across time
(q.v. Jacob, 2002; Cloonan, 2009; Sutherland, 2024)

From the perspective of posterity, *pace* Descartes, *memoratus ergo sum* [I am remembered, therefore I am]. "What's past is prologue" (Shakespeare, 1610, II.1).

2.1.4 COROLLARY

The fundamental premise of the preservation enterprise: Given something yesterday, intervene as necessary in order to give that thing back – or forward – to enable meaningful informative experience tomorrow
(Abrams, 2025a)

The framing questions for the design and implementation of that intervention are: Given *what*, *from whom*, *where*, *when*, *how*, and *why*? Giving *what*, *to whom*, *where*, *when*, *how*, *why*, and with *what effect*? Informative carriers (i.e., the *what*) and mediating processes (*how*) are the vehicle but not the *raison d'être* of the endeavor (intentional/expectational *why* and resulting *effect*). Any contemporaneous means to effectuate preservation assurance is an ephemeral instrumental concern rather than enduring teleological one. The process is not the goal.

Thus, preservation is ultimately *communicative* rather than merely managerial in nature, concerned with the transmission of past informative expression for future informative experience (Foote, 1990; Abrams, 2023).

2.1.5 DEFINITION

Information experience is the totality of informative engagement through which meaning is derived (Bruce et al., 2014)

While "experience is the best teacher" (Caesar, *Commentarii de Belo Civili*, bk. 2, ch. 8), "experience is not what happens to [one]; it is what [one] does with what happens to [oneself]" (Huxley, 1933, p. 5).

2.2 AXIOM

Contemporary information experience unfolds primarily through computational mediation

We live in a "digital-first" age (Baskerville et al., 2020). Information, regardless of its originating form, is most commonly and productively referenced and experienced through digital representations. Those representations are inherently susceptible to corrosive stress arising from incessant technological evolution, transformation, obsolescence, and disruption. Left unameliorated, those stresses will lead to irretrievable informative damage or loss.

2.2.1 DESIDERATUM

Minimize barriers to entry

Given the inherent fragility of digital information, the single most important act in the informative lifespan is accession into an appropriate program of deliberate stewardship. While programmatic care doesn't necessarily guarantee preservation success, its absence almost certainly leads to preservation – and communicative and informative – failure.

2.2.2 AGENDUM

Invoke preservation stewardship as a consequential side-effect of routine modalities of information production and management

Non-preservation practitioners are entitled to expect positive preservation results without deep domain knowledge or non-trivial effort. What if the Save menu option really meant SAVE, not just locally and transiently, but globally and persistently?

It is important to note, however, that considerations of preservation universality and persistence must always be qualified with critical nuance: Saving all the *right* things for the full *right* duration. The agenda here is *not* to uncritically accept anything for all time, but rather, to maximally *streamline* the deliberate acquisition of properly vetted things for as long as they possess threshold curatorial and programmatic value. This has implications for both manual and automated aspects of preservation workflows.

2.3 AXIOM

Submission is not (necessarily) acceptance

Given that preservation activity is inherently positioned within an environment of (potentially) infinite demand but finite resource, acceptance of information submitted for programmatic consideration is always contingent on curatorial appraisal and selection.

2.3.1 DESIDERATUM

Be deliberate, but welcoming

Entrance to programmatic stewardship is always through a door and doorkeeper, but that portal should be as wide open and lenient as programmatically responsible.

2.4 AXIOM

Persistence is not (necessarily) permanence

Retention of preserved information is always contingent on a sustainable balance of curatorial policy and assessment supportable by programmatic capability and capacity.

2.4.1 DESIDERAUM

Periodic (re)assessment

Value is not fixed, but rather, culturally – and programmatically – contingent. Ongoing reassessment is necessary to confirm retention or schedule for deaccessioning.

2.5 AXIOM

Preservation in the digital arena is both conceptually similar to and operationally distinct from its non-digital cognate activities

Digital preservation is broadly aligned with the strategic principles, goals, and intentions of tangible preservation and conservation (q.v. LC, 2026), but increasingly differs, often in fundamental – if not incompatible – ways, the further one is immersed in tactical considerations.

2.5.1 DESIDERATUM

Avoid facile equivalencies

Reductive recourse to programmatic analogies to common practices in tangible conservation and archiving should be approached with caution to ensure they are conceptually and operationally valid.

2.5.2 AGENDUM

Periodic abductive (re)derivation and/or confirmation of principles and practices

Affirmation of core programmatic parameters suggested from questioning assumptions, definitions, and inferences regarding the fundamental nature of information and preservation as applicable in the digital realm.

2.5.3 DEFINITION

Digital preservation is the programmatic application of people, policies, procedures, and platforms (i.e., who, why, what, how/when/where) facilitating technologically-mediated human communication across time

The technological aspect of preservation is an enabling instrumentality rather than the decisive teleology of the enterprise. Thus, preservation represents "the great medium of communication between mind and mind, as respects different individuals, countries, and periods of time" (Trustees, 1852, p. 3). As such, preservation-enabled communication transcends the barriers of temporal distance, technical distance, and cultural distance.

2.6 AXIOM

Programmatic perspectives implicitly embrace extended time horizons of concern and action

A programmatic, as opposed to project-oriented, approach to preservation stewardship is characterized as being proactive whenever/wherever possible and reactive (only) when/where necessary, and emphasizes continuity of care across archival timespans.

Proactivity is emphasized by the very etymology of the term "preservation", from the Latin *præ* [before] + *sevare* [to keep safe], which thus carries the sense of intentional *ex ante* protection *from* harm rather than *post factum* remediation *of* harm.

2.6.1 DESIDERATUM

Advocacy and support for reliable ongoing commitment and resourcing

The importance of proactivity follows from the inherent dichotomy between preservation of tangible and digital materials. For the former, use is inherently destructive while custodial "benign neglect" – albeit in appropriate environmental conditions – may be inconsequential, as *post factum* restoration is often a viable response. In the digital realm, on the other hand, use is inconsequential with respect to preservation concerns, while neglect – even if occasional and short-lived – can be catastrophic (q.v. DeRidder, 2011).

2.6.2 DESIDERATUM

Risk profile, action plans, and preservation watch

Risk may arise internally or externally due to commissive acts or omissive conditions originating through coincidence, negligence, or malfeasance (Rosenthal et al., 2005; Barons et al., 2021; Pennock, 2024). Every identified risk should be addressed through an explicit plan (q.v. Souza & Aganette, 2020; e.g., NARA, 2025) described in terms of anticipatory analysis, affirmative avoidance, active monitoring/incipient recognition (Lucker et al., 2018), and remediative response.

2.6.3 COROLLARY

Preservation programs operate at the behest of their stakeholders on behalf of their beneficiaries

Programmatic stewardship is generally a delegated responsibility under an institutional aegis of administrative, financial, intellectual, and political agency. Stakeholders are those agents exercising substantive control or influence over the constitution and conduct of the program.

Beneficiaries are those realizing the positive benefits of programmatic outcomes. In the preservation case, these are the individual patrons making meaningful use of preserved information over time. Collectively, the beneficiary of digital preservation is posterity in all its rich and often surprising, if not unruly, diversity.

3 Talk To Me

What is the (general) nature of preservation-enabled communication?

3.1 AXIOM

As a communicative endeavor, digital preservation is best conceptualized through the lens of communicology

While digital preservation has been (informally) characterized as "communication with the future" (e.g., Thibodeau, 2002; Moore, 2008; Mois et al., 2009; Brocks et al, 2010), the consequential implications of that aphorism have not been fully explored.

3.1.1 DEFINITION

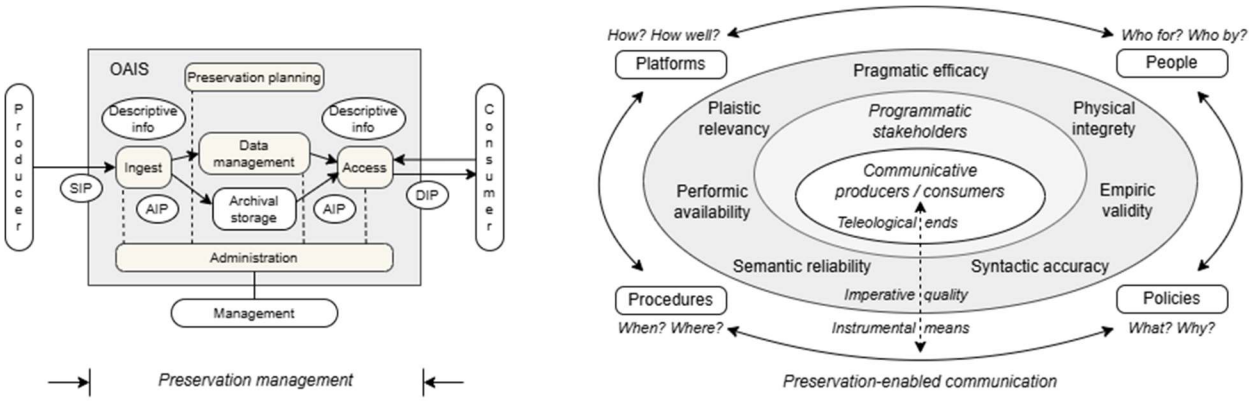
Communicology is the study of embodied discourse considered as the semiotic expression, propagation, and interpretation of meaning-laden signs within contingent systems of signification

By virtue of its focus on *individually*-embodied discourse (e.g., author/reader), communicology is distinct from the *disembodied* technological concerns of information-theoretic communication (system/system) and the *socially*-embodied concerns of mass communication (media/audience) (Catt & Eicher-Catt, 2010). While the intersubjective basis of preservation-enabled communication implicates a strong socially-contextualized component, ultimate communicative experience is particular to the individual communicative consumer (Abrams, 2025b).

3.1.2 DESIDERATUM

Place human productive and consuming agency at the <u>center</u> *of preservation concern*

The prevailing OAIS functional diagram (ISO, 2025b) visually pushes productive and consuming agency to the periphery of (metaphoric) attention (see Figure 3.1(a)).



(a) (b)

Figure 3.1 – Managerial vs communication-centered preservation

OAIS diagram adapted from (ISO, 2025b)

This implies that the boundaries of the archival system (both programmatic and technological) delimit the extent of preservation concern and attention (Abrams, 2018). By intention, the OAIS diagram delineates a descriptive *reference model* for a socio-technical preservation system. The communicative alternative (Figure 3.1(b)) serves a different purpose in promoting an analytic *approach* for (more) properly conceiving such a model and system with human centricity. Unlike the implied linear progress of OAIS, the communicative approach is characterized by iterative radial and circulatory motion, as exemplified by the DCC and d-KISTI lifecycle models (Higgins, 2008; Rhee, 2024). The instrumental implications of this approach are presented in Section § 6.

OAIS does provide an opportunity to capture a sense of consumer needs through the concept of *representation information* mapping data to "more meaningful concepts" for a consumer (ISO, 2025b, p. 1-14). In practice, however, this facility tends to focus on data's physical, empiric, and performic rather than syntactic, semantic, or plaistic aspects. This effectively reduces OAIS to the preservation equivalent of Shannon's (1948) mechanistic information theoretic "engineering problem" of passing messages (e.g., digital information) across a noisy channel (socio-technic evolution, risk, and disruption), in consideration of which semantic meaning, let alone pragmatic response, "are irrelevant" (p. 379). Recasting preservation as a communicative problem recenters human agency to its proper controlling position, and meaningful teleological understanding, rather than instrumental accessibility, as its proper goal.

3.2 AXIOM

Communication does not imply (retrospective) conversation

Preservation-enabled communication is unidirectional, *from* the past *to* the future. In general, there is no preservation-facilitated means to go back in time to reacquire or ask for further explication or refinement of informative expression. The entropic arrow of time (Eddington, 1928) leaves the ever-forward-moving point of contemporaneity only with the then-preserved message as *the* message.

3.2.1 COROLLARY

Communication <u>does</u> imply (prospective) dialog

Preservation should strive to provide for the continual embellishment of the communicative understanding of, and response to, preserved information through actual contemporary and facilitated future programmatic stewardship, consumer experience, and community discourse. Preserved information properly functions as the "root text" (q.v. Hackett, 2016) of the communicative process, the starting – rather than the ending – point for further experiential interpretation and extrapolation.

3.3 DESIDERATUM

Emphasize dynamic process over static substance

Preservation process potentially has mutable form *in* time – always reflective of then

contemporaneous best practice – but constitutes an enduring imperative *over* time; that is, yesterday's, today's, and tomorrow's process may be different, but there always is a process. Preserved substantial quality, on the other hand, should always have static form *in* time but is ephemeral *over* time; that is, preservation ensures an accepted substantial state at any point in time, but perhaps many states across time Given that state is the result of process, process possesses the imperative priority.

3.4 AXIOM

Preservation is a processual pursuit of endless becoming, and never fulfilled being
(q.v. Whitehead, 1928; Jones, 2005)

An assertion of "being preserved" cannot be made for all time; it only holds at the ever-evanescent instant-in-time of the contemporaneous assertion.

3.4.1 DESIDERATUM

Care for what you have, with what you have

Responsible and prudent stewardship implies leaving things no worse off (and, ideally, better off) than you found them, and being prepared to hand-off preservation responsibility to future generations (q.v. Janée et al., 2009), maintaining continuity of care to ensure continuity of memory.

3.4.2 AGENDUM

Find the right balance

Preservation stewardship necessitates a careful balancing of ethical beneficence and non-maleficence, that is, *primum bendicere* [first, do good] vs. *primum non nocere* [first, do no harm] (q.v. Gillon, 1985a, 1985b). Doing good here and now might lead to deleterious, and possibly irreversible, outcomes elsewhere and else-when; conversely, delaying intervention here and now might jeopardize legitimate – and desirable – opportunity elsewhere and else-when. Thus, there is an inherent tension at the core of the enterprise, which should be approached with comingled professional confidence tempered with humility, operational dispatch complemented with deliberation, and programmatic prudence vitalized with aspiration.

4 Good Things Come in Threes

What is the (specific) nature of preservation-enabled communication?

(Introduction of core communicative concepts explored in more philosophical depth in Section § 5.)

4.1 AXIOM

Digital information has an inherent tripartite aspect: the physical, the logical, and the conceptual
(q.v. Thibodeau, 2002)

The physical aspect encompasses information's tangible manifestation, e.g., bits *on* a storage medium or *in* a communication channel. The logical encompasses its symbolic representation and rhetorical expression, e.g., the encoding format and persuasive structure of an informative narrative. The conceptual encompasses its semantic essence as encapsulated in physical and logical form for subsequent agential consumption, understanding, and reaction.

4.1.1 COROLLARY

These aspects correspond to tripartite modes of constitutive isness, denotative ofness, and connotative aboutness

How the information is organized, what it ostensibly presents, and what it interpretably (re)presents. For example, this document *is* an Office Open XML file; it is *of* a series of axioms, corollaries, definitions, desiderata, and agenda; and it is *about* a communicologically-based theory of and agenda for the digital preservation enterprise.

Note that while the locution "this document is of …" may appear clumsy to the eye and ear (certainly so in English vernacular), the conceptual constitution/denotation/connotation distinction is meaningful. The is/of/about terminology is borrowed from well-established subject cataloging convention (q.v. Layne, 2002; Hjørland, 2017).

4.2 AXIOM

Digital preservation has an inherent tripartite focus: concern for information objects, information performances, and information experiences

An object is the thing being preserved, that is, an immanent encapsulation of physical isness, logical ofness, and conceptual aboutness (cf. Amaral et al., 2023). A performance is the dynamic use made of the preserved thing, that is, the behavioral processes that reveal the thing's objective essence to a consuming agent *(Heslop et al., 2002)*. An experience is the emergent cognitive, affective, and conative agential *consequence* of the behavioral engagement.

4.2.1 COROLLARY

Digital preservation has an inherent tripartite intentionality regarding strategy and tactics: the bit-level, the functional, and the utile

Preservation assurance is often characterized in terms of bit-level vs. functional preservation (q.v. da Silva Júnior & Borges, 2016). The former is concerned with the integrity of an object's tangible manifestation, primarily through storage replication and fixity audit (Zierau, 2012). The latter is concerned with an object's higher-level instrumental characteristics, that is, descriptive properties necessary "to know what the content is" (NDSA, 2026); behaviors, that is, experienceable actions necessary to render preserved bits in humanly-sensible form; and context, that is, relational associations pertinent to purposive use and intersubjective interpretation.

Note, however, that the successful outcome of functional preservation is a *potentiality*, the putative access to preserved information, that is, "the ability *to get to* archival resources through intellectual, digital, or physical means [emphasis added]" (SAA, 2026). Critically, *getting to* something is quite distinct from actually *using* it to fulfill contextual expectations. Consistent with the communicative conceptualization of preservation, successful *kinetic* consumption and understanding of accessible information necessitates a third strand of intentional strategy and tactics: the utile. Utile preservation provides assurances regarding teleological experience, that is, purposive use and pragmatic understanding (see Table 4-1).

Focus	Bit-level	Functional	Utile
Salience	Substantial being and persistence	Instrumental characterization, behavior, and context	Teleological use and understanding

Table 4-1 – Preservation focus and salience

The granular communicative reframing of preservation to embrace the bit-level, functional, and utile – with concerns inclusive of objective qualities of physical manifestation, logical symbolic encoding and rhetorical expression, and conceptual semantic meaning; performative qualities of accessible behaviors; and experiential qualities of interpretation and understanding – offers the means for advantageous definitional concision and precision regarding programmatic intention, action, and evaluation (Abrams, 2018).

4.3 AXIOM

Many traditional approaches to preservation stop with provision of functional access without addressing full experiential utilization

The focus of preservation concern is often adumbrated in terms of normative consideration of substantial existence and instrumental access rather than teleological use (Bak, 2016; Abrams, 2025b). This has the unfortunate consequence of narrowing attention to the managerial core of preservation activity at the expense of broader communicological concerns. The shift in locus of agency is significant: access is something technically *offered by* preservation providers, while use is something experientially *taken advantage of* by information seekers.

4.3.1 COROLLARY

The proper evaluative measure of preservation is communicative success, not just programmatic trustworthiness

Similar to the critical accessibility/usability distinction, trustworthiness (q.v. Yakel et al., 2013) is an enabling condition for ultimate enabled communicative success, that is, the state of preserved information being usable by a contextually-situated consuming agent (Abrams, 2025b).

4.4 AXIOM

Any definitive assertion of success is problematic

Success is a matter of contingent usage and such uses are manifold, if not serendipitous, and thus not susceptible to comprehensive anticipation. By analogy to Popper's concept of scientific falsification – a theory is considered presumptively true until determined definitely false (Popper, 1959; Tredinnick, 2006) – preservation success should be viewed as a measure of programmatic outcome *so far* (Abrams 2023).

4.4.1 DESIDERATUM

Maximize progress towards potential success by minimizing opportunities for actual failure

While it remains programmatically appropriate to aspire to the fullest possible state of success as a policy imperative, strategic and tactical planning and implementation properly focus on what is known or expected.

4.5 AXIOM

Preservation-enabled communication is a semiotic process

Semiosis embraces the totality of information production, stewardship, and experience underlying the transmission of meaning through the interplay of communicative *signs* (Nöth, 1990), "something which stands to somebody for something in some respect or capacity" (Peirce, 1931). Since communicative transmission lies at the core of the preservation enterprise, preservation itself is properly viewed as a semiotic activity (Abrams, 2023).

Peirce's triadic semiosis – formulated as a multilateral relationship between a concrete representational signifier, an underlying abstract signified referent, and a resulting experiential interpretation (Peirce, 1931; Mingers & Willcocks, 2023) – is most appropriate as a framework for preservation, as it implicates the full range of preservation concerns.

5 Show Me a Sign

What is the (semiotic) nature of preservation-enabled communication?

(In-depth exploration of core communicative concepts introduced in Section § 4.)

5.1 AXIOM

The semiotics of digital *preservation implicate nuanced dimensions of consideration not fully captured by traditional models*

The traditional triumvirate of semiotic dimensions – syntactics, semantics, pragmatics (Morris, 1938) – should be extended to encompass all concerns implicated in preservation-enabled communication (Abrams, 2023) (see Table 5-1).

Perspective	Managerial				Communicative		
Concern	Information object				Information performance	Information experience	
Aspect	Physical	Logical		Conceptual			
Mode	Constitutive isness	Denotative ofness		Connotative aboutness			
Valence	Informative thing				Informing process		Informed knowledge
Intention	Bit-level	Functional				Utile	
Dimension	**Physics**	**Empirics**	**Syntactics**	**Semantics**	**Performics**	**Plaistics**	**Pragmatics**
Function	**Reificatory**	**Representational**	**Rhetorical**	**Ontological**	**Epistemological**	**Associational**	**Phenomenological**
Affordance	**Manifestation**	**Encoding**	**Expression**	**Meaning**	**Behavior**	**Context**	**Understanding**
Exemplar	Notes.docx	Office Open XML Document	Axioms, corollaries, definitions, …	DP theory & agenda	Page rendering, navigation, search, print, …	Authorial and community discourse	"Aha, *that* DP theory & agenda"
Imperative	Authenticity				Accessibility	Legitimacy	
	Integrity	Validity	Accuracy	Reliability	Availability	Relevancy	Efficacy
Focus	Bit-level	Functional					Utile
Salience	Substantial being	Instrumental means					Teleological ends
Basis	Immanent				Emergent		
Measure	Quantitative outputs				Qualitative outcomes		
Warrant	Objective				Intersubjective		
Evaluation	Enabling trustworthiness				Enabled success		
	Necessity →			*Normativity* →			*Sufficiency*

Table 5-1 – Semiotic map of digital preservation theory
Adapted from (Abrams, 2023, 2025b)

(Dashed lines are used purposely to emphasize that these categories are not disjoint and sharply delineated. Rather, they indicate conceptual centers-of-gravity with permeable overlapping extents.)

Stamper's "semiotic ladder" (1996), developed for application to information and communication technology (ICT), particularly in organizational settings, subdivides syntactics into nuanced

concerns for physical signal, symbolic encoding, and rhetoric expression, and also incorporates a new dimension of concern for shared social context. Useful as these extensions are, they do not encompass the notion of digital *performance* as a necessary digital-to-sensory intermediation central to human information experience (q.v. Heslop et al., 2002).

Each semiotic dimension is independently susceptible to programmatic success or failure, or more properly, an outcome positioned along a continuum of success or failure.

5.1.1 (RE)DEFINITION

Digital preservation is the programmatic application of people, policies, procedures, and platforms facilitating technologically-mediated human communication across time, maximizing assurances regarding authenticity of object, accessibility of performance, and legitimacy of experience

Semiotic grounding suggests granular criteria – integrity of manifestation, validity of encoding, accuracy of expression, and reliability of meaning (collectively, authenticity); accessibility/ availability of behavior; relevancy of context and efficacy of understanding (collectively, legitimacy) – for considering programmatic intentions and communicative expectations (cf. Section § 2.5.1).

5.1.2 DEFINITION

Physics is the semiotic dimension concerned for reificatory manifestation

Bits on a storage medium or in a communication channel, characterizable in terms of their informative integrity; that is, being whole and unchanged from canonical form. In other words, the reified tangibility underlying preserved information's substantive existence.

For example, this white paper considered *purely* as a file on a file system or in an object store.

5.1.3 DEFINITION

Empirics is the semiotic dimension concerned for representational encoding

Formatted structure of physical bits, characterizable in terms of its informative validity; that is, conformance to an authoritative format specification. In other words, the symbolization by which preserved information *stands* for something.

For example, this white paper considered *purely* as a .docx Office Open XML-encoded file.

5.1.4 DEFINITION

Syntactics is the semiotic dimension concerned for rhetorical expression

Persuasive structure of empiric encoding, characterizable in terms of its informative accuracy; that is, suitability in evoking the purposive narrative. In other words, the persuasive structure through which preserved information enacts its informing.

For example, this white paper considered *purely* as a document composed of pages, sections, paragraphs, tables, citations, etc. presenting scholarly analysis and argument articulated as a structured set of axioms, corollaries, definitions, desiderata, and agenda.

5.1.5 DEFINITION

Semantics is the semiotic dimension concerned for ontological meaning

Underlying sense of syntactic rhetoric, or what the information *is*, characterizable in terms of its informative reliability; that is, being factually truthful to its purposive narrative. In other words, what preserved information informs about.

For example, this white paper considered *purely* as opinionated reflections regarding a plausible working theory and research agenda for the digital preservation enterprise.

5.1.6 DEFINITION

Performics is the semiotic dimension concerned for epistemological behavior

Performative behaviors providing agential entrée to semantic meaning, characterizable in terms of its informative accessibility; that is, supportive of meaningful engagement at a time and place and in a manner of consumer choosing. In other words, the participatory actions through which preserved information carries out its informing.

For example, this white paper considered *purely* as "read" with Microsoft Word.

5.1.7 DEFINITION

Plaistics is the semiotic dimension concerned for associational context
(from the Greek πλαίσιο [plaisio], "frame" or "scope")

Meta-information informing consumer expectations and shaping interpretive sense-making, characterizable in terms of its informative relevancy; that is, pertinence to a contingent acculturated purpose. In other words, the contingent interpretive positionality of preserved information within a wider informative ecology.

For example, this white paper considered *purely* with respect to the author's prior publication record (e.g., Abrams, 2013, 2015, 2018, 2023, 2025a, 2025b) and broader discourse within the preservation community and scholarly record.

5.1.8 DEFINITION

Pragmatics is the semiotic dimension concerned for phenomenological understanding

What one now knows, feels, or does in response to information experience, characterized in terms of its informative efficacy; that is, its success in satisfying intentional or serendipitous consumer

purpose.

For example, this white paper as considered purely in terms of its cognitive, affective, and conative impact on a reader. In other words, the agential effect that preserved information has.

5.2 AXIOM

Preservation intentions, actions, and outcomes are semiotically distinct

The functional affordances associated with each of the semiotic dimensions may have strong affinities, if not causal dependencies, but they are conceptually, operationally, and teleologically independent. For example, it is quite possible, and legitimate, to preserve informative syntactics and semantics without original physics and empirics – this is, in fact, the basis for the strategy of migration; emulation, on the other hand, retains physics and empirics (q.v. Rothenberg, 1999). In general, each dimension can be preserved or not independent of the others.

5.2.1 DESIDERATUM

Incorporate the full range of semiotic concerns into programmatic thinking and activity

The teleological goal of meaningful usage of preserved information implicates incumbent support for all dimensions of semiotic communication.

5.2.2 AGENDUM

Pathways for extending beyond baseline managerial necessity and normativity of current practice towards full communicative sufficiency

Recognition of a more comprehensive conceptualization of the field is the first step in revitalizing the preservation enterprise.

6 Just Do It

What is the nature of the preservation enterprise?

6.1 AXIOM

Preservation functions operate across a (metaphoric) temporal span of yesterday, today, and tomorrow

The substantive – as opposed to administrative – aspects of a preservation program can be viewed as a layered set of primary programmatic functions (see Table 6-1).

Predilect *Decision-making*						
Collect *Acquisition*		**Respect** *Care*			**(Re)direct** *Share*	
Prospect *Appraisal*	**Select** *Accession*	**Inspect** *Characterization*	**Inflect** *Representation*	**Protect** *Safeguarding*	**Project** *Publicize*	**Connect** *Fulfill*
Introspect *Internal assessment*						
Reflect *External accountability*						
Yesterday	→		*Today*	→		*Tomorrow*

Table 6-1 – Programmatic map of digital preservation practice

Adapted from (Abrams, 2015)

6.1.1 DEFINITION

Predilection is the preservation function deciding, documenting, and publicizing what to do, why, when, where, how, by whom, and for whom

Consult with stakeholders and track community best practices; identify needs, aspirations, capabilities, and capacities; establish goals, policies, strategies, tactics, priorities, and metrics; provision necessary platforms and resources.

Policies constitute the controlling service "contract" between preservation service providers and those they serve, declaring accountable intentions and thus forming the basis for stakeholder/ beneficiary expectations (Abrams, 2018).

6.1.1.1 DESIDERATUM

Predilected decisions made in reference to the programmatic audience

The OAIS concept of "designated community" (ISO, 2025b) is intended to increase the tractability of preservation effort by focusing on a small number of pre-defined *classes* of information seekers, homogeneous in context, need, and goal, rather than a potentially limitless universe of heterogeneous *individuals*. However, putting this notion into practice can be problematic (q.v.

Bettivia, 2016; Moles, 2026). The reductive exclusivity of designation inappropriately curtails consideration for the non-designated, impinging legitimate variant, serendipitous, or newly-arising information seeking and seekers. The true designated community of preservation is not a subset, but rather, the totality of posterity. "Eighty-one years [before the first patron loan of a library book]… You wonder who they bought these books for anyway." "We bought them for *you*, Mr. Basbanes [emphasis in original]" (Basbanes, 2001, p. 8).

6.1.1.2 AGENDUM

Complement prescriptive "designated" communities with descriptive "demographic" communities

In order to be maximally responsive to the most open-ended current and future audience, identify descriptive characteristics of elastic demographic classes in terms of common context and concern (q.v. Abrams, 2025). Any particular demographic category can be thought of as a Husserlian *lebenswelt* [life-world] (Husserl, 1936) encompassing a comprehensive set of constructive Goodman spaces of meaning-making (q.v. Goodman, 1978; Flanagan, 2009):

1. *Art*, the symbolic space of poetic imagination through which the familiar is made strange (Boym, 2009)
2. *Science*, the space of logical reasoning through which the strange is made familiar (Chalmers, 2013)
3. *Technology*, the space of practical application of conceptual knowledge (Salomon, 1984)
4. *Ethics*, the space of individual self-regulation ("What should *I* do?") (Laudon, 1995)
5. *Politics*, the space of collective consensual regulation ("What must *we* do?") (Lasswell, 1936)
6. *Spirituality*, the space of (theistic) transcendent or (non-theistic) immanent numinance (Kim, 1987)

While such an exhaustive range of human concerns may seem superfluous to preservation consideration, such an inclusive *weltanschauung* [worldview] (Dilthey, 1911) implicitly conditions all human information encounters (Allan, 2023). Greater understanding of common shared lived experience, goals, needs, and aspirations facilitates efforts to provide the highest possible service to the broadest possible audience.

6.1.1.3 DESIDERATUM

Set expectations through explicit intention statements
(q.v. Gattuso, 2017)

Although the concept of intention is incorporated into the latest OAIS revision as Preservation Objectives (ISO, 2025b; Moles, 2026), "intention" is a more preferable term than "objective" as it more directly implicates the active curatorial agency accountable for the development and pursuit of the

intention.

6.1.1.4 DESIDERATUM

Documentation of policies and procedures

Shareable human-readable and formal notation enabling machine actionability (q.v. DPC, 2024b).

6.1.1.5 AGENDUM

Expression language for formal documentation

Formal expression in the spirit, if not the use, of PAR (q.v. Addis et al., 2018).

6.1.2 DEFINITION

Collection is the preservation (meta-)function accepting digital information for affirmative programmatic care

Deliberate stewardship in a proactive program is the single most important stage in the informative lifespan. With it, many preservation outcomes are *possible*; without it, *none* are likely. Collection implicates functional prospection and selection, representing a necessary winnowing down from the possible to the necessary and achievable.

6.1.2.1 DEFINITION

Prospection is the preservation function recognizing the universe of information of potential pertinence for stewardship

Collection development can encompass push (i.e., *accepting* from) and pull (*soliciting* from) modalities dependent on programmatic mission, responsibility, and policy.

6.1.2.1.1 DESIDERATUM

Embed preservation decision-making as early as possible in information considerations

Decisions made early on in the pre-preservation stages of the information lifecycle, often by default rather than deliberation, can either help or hinder downstream preservation efforts and outcomes. In cases where productive latitude exists, the creation or acquisition of information should be amenable as possible to preservation considerations.

6.1.2.1.2 DESIDERATUM

Promote preservation literacy by stakeholders
(cf. information literacy, q.v. Tewell, 2015)

Educational outreach and training in preservation issues. High levels of literacy turn programmatic stakeholders from passive *customers of* into engaged *partners in* the preservation enterprise,

facilitating more positive and sustainable outcomes.

6.1.2.2 DEFINITION

Selection is the preservation function of acquisition, appraisal, and accession

Evaluation of prospective resources leading to a decision to accept or reject for programmatic stewardship (q.v. Tallman et al., 2026).

6.1.2.2.1 DESIDERATUM

Distinguish criteria for intellection selection and acquisition form

This is the difference between a determination of *whether or not* to collect an information resource and *how* to collect it, that is, the manifest representation that best embodies the information in a curatorially-meaningful and preservation-amenable manner. Note that this *ante factum* determination of acquisition form before programmatic custody may be later supplemented with *post factum* inflection of the preserved form once in custody (see Section § 6.1.3.2).

6.1.2.2.2 AGENDUM

Selection criteria

Identification of pertinent factors for curatorial appraisal and selection decision-making (e.g. Harvard Library, 2026) as well as acquisition form.

6.1.2.2.3 DESIDERATUM

Registrarial records of materials under stewardship

Documentation of accessioning processes and resulting asset inventory of holdings (q.v. Bowes, 2023; DPC, 2024a).(

6.1.2.2.4 AGENDUM

Documentation of donor agreements, methodology statements, data management plans, terms-of-use, etc.

Human-readable and formal notation enabling machine actionability.

6.1.3 DEFINITION

Respection is the preservation (meta-)function providing programmatic attention necessary to achieve intended and expected preservation results

Core functions forming the historical focus of preservation concern (e.g. ISO, 2025a, 2025b). Respection implicates functional inspection, inflection, and protection.

6.1.3.1 DEFINTION

Inspection is the preservation function examining resources to identify pertinent characteristics

Inspection encompasses documentation of constitutive isness, indicative of physical manifestation and empiric encoding; denotative ofness, indicative of syntactic expression, semantic meaning, and performic behavior; and connotative aboutness, indicative of plaistic context and pragmatic understanding (Abrams, 2025b).

6.1.3.1.1 DESIDERATUM

Avoid reductive prescription of characteristic significance

Historically, pertinent characteristics have been considered in terms of *significant properties*, those that are "deemed important by designated user communities" (Hedstrom & Lee, 2002, p. 218; q.v. Becker, 2018). Thus, the notion of significance is subject to criticism similar to that applied to designated community (see Section § 6.1.1.1): any explicit statement of significance implicitly relegates all other properties to insignificance, raising the questions of who benefits and who decides?

6.1.3.1.2 AGENDUM

Complement analysis of prescriptive "significant" properties with descriptive "symptomatic" properties

The inherent intersubjective nature of preservation leaves any contemporary determination of future users and uses problematic. On the other hand, the inevitability of finite programmatic resourcing precludes the ability to preserve all aspects of all things in an efficient, effective, and sustainable manner. While discernment is therefore necessary, the significant/symptomatic distinction is one of agential intention. Significance is a determination of prescriptive judgement, that is, what is *deserving* of care as a matter of privilege. Symptomaticity, on the other hand, is concerned with gaining fuller understanding of distinguishing attributes for purposes of reasoned decision-making. That discern should aspire to the proper balance of programmatic expenditure on the desirable vis-à-vis the tractable, the beneficial outcome of the perfect vis-à-vis the "good enough", and the extrapolated needs of the foreseeable vis-à-vis the ever-surprising future.

6.1.3.1.3 DESIDERATUM

Format characterization

Empiric-level examination in the spirit of JHOVE/JHOVE2 (Abrams et al., 2009).

6.1.3.1.4 DEFINITION

Format is a serialized encoding of an abstract data model
(Abrams & Seaman, 2003)

Format constitutes the empiric mapping back and forth between humanly-cognizable meaning and humanly-opaque physical manifestation. *Pace* Wheeler (1989), format is a proximate means for retrieving "it from bit" (p. 309).

6.1.3.1.5 DEFINITION

Characterization is the automated examination of formatted information for purposes of format identification, validation, property extraction, and policy-based assessment
(Abrams et al., 2009)

Characteristic classification enables efficiency through processing of like with like.

6.1.3.1.6 DEFINITION

Identification is the preservation function determining the putative format of an encoded representation
(q.v. Jackson et al., 2025)

Understanding of the format of information representation critically enables higher levels of preservation functions against otherwise opaque bitstreams. Identification is facilitated by mainstream tools such as DROID, FIDO, Siegried, etc. (Spencer, 2022).

6.1.3.1.7 DEFINITION

Validation is the preservation function determining whether a representation conforms to its format's authoritative specification

Validity enhances future accessibility, usability, and potential preservation intervention.

6.1.3.1.8 DEFINITION

Extraction is the preservation function recovering salient properties of manifestation, representation, expression, and meaning

Extracting characteristic description directly from the thing described is often more reliable than that assumed during production processes.

6.1.3.1.9 DEFINITION

Assessment is the preservation function valuating suitability for contextual purpose, recognizing the distinction between validity and acceptability

Validity is an objective measure of informative constitution, while acceptability is a pragmatic measure of informative suitability for purposive use.

6.1.3.1.10 DESIDERATUM

Comprehensive format registries

Sustainable resource(s) providing authoritative format information and specifications, e.g., IANA MIME types (2026), LC digital format sustainability (2025), PRONOM (TNA, 2026); q.v. GDFR/UDFR (Abrams, 2005; CDL, 2012), DPC Registries of Good Practice (2024b).

6.1.3.1.11 DESIDERATUM

Standardized metadata schemas representing characterization properties

Common representational forms facilitates persistent and sharable characterization information (q.v. Dappert & Enders, 2010).

6.1.3.1.12 DESIDERATUM

Index/search of characterization properties

Ready access to characterizing metadata is necessary for analytics, analysis, and planning.

6.1.3.1.13 DESIDERATUM

Extension of format characterization function through (re)configuration rather than (re)coding.

Formal grammar-based characterization in the spirit of XCL (Becker et al., 2008), based on viewing a format as a formal language in the Chomsky hierarchy (Chomsky & Schützenberger, 1963). If possible, this recasts support for characterization from targeted special-purpose tools to a general-purpose characterization engine directed by external machine-actionable format specifications. This shifts the agency of characterization support effort from software development to specification analysis.

6.1.3.1.14 AGENDUM

Investigate suitability of formal grammar characterization to formats spanning the full Chomsky hierarchy

A grammar-based approach appears plausible for formats definable as Type 3 regular languages and perhaps even Type 2 context-free languages, but it is unclear as to the suitability for Type 1 (context-sensitive) or 0 (recursively enumerable) languages.

6.1.3.1.15 DESIDERATUM

Malware detection, interdiction, and sanitization

Malicious exploits embedded in accessioned content imperils communicative and programmatic integrity (q.v. Pennock et al., 2019).

6.1.3.1.16 DESIDERATUM

Semantic characterization

Intellectual description is necessary to evaluate pertinence and support effective discovery.

6.1.3.1.17 AGENDUM

Application of AI, natural language processing, image analysis, audio analysis, etc.

Textual summarization, named-entity extraction, sentiment analysis; OCR; voice-to-text (q.v. Johnson et al., 2020; Saccucci & Salaba, 2021).

6.1.3.2 DEFINITION

Inflection is the preservation function codifying information representation

Any given unit of preservable information can be represented in many (roughly) equivalent forms (see Section § 0). The form used as the basis for proactive programmatic stewardship, e.g., the AIP, should be established to optimize programmatic care and maximize desired results. This may be quite distinct from information's native form "in the wild"; the form submitted for stewardship consideration (SIP); or the form disseminated to consuming agents (DIP).

Inflection potentially encompasses canonicalization (Lynch, 1999), normalization (Rosenthal et al., 2005), desiccation (Abrams et al., 2008), embellishment, and other manipulations or derivations in structural and descriptive form. Note that these *post factum* inflections of preserved form once in programmatic custody may supplement earlier determination of acquisition form before acquired into custody (see Section § 6.1.2.2.1).

6.1.3.2.1 DESIDERATUM

Framework for rich modeling with minimal requirements

Abundant opportunity for pertinent detail and optimized handling without imposing costly or non-trivial prescription.

6.1.3.2.2 AGENDUM

Modeling unification

Conceptual and data modeling for preservation purposes falls into three main categories: bibliographic, exemplified by the IFLA Library Reference Model (LRM) (Riva et al., 2024); archival, exemplified by the ICA ISAD(G) (ICA, 2000); and museological, exemplified by the ICM CIDOC Conceptual Reference Model (CRM) (Bekiari et al., 2024). Without questioning the validity of or necessity for diverse modeling practices for *optimized* function to *specialized* stakeholders, what is the potential for a common practice rich enough to model arbitrary information resources generically without significant loss of domain-specific pertinence?

6.1.3.2.3 DESIDERATUM

Capture, maintain, and enhance the fullest possible informative context

Not singular context, but multiple contexts (q.v. Beaudoin, 2012):

1. The context of production, which provides insight into creative intention. In light of the intentional fallacy (Wimsatt & Beardsley, 1946; Lamarque, 2006), such insight is properly seen as suggestive rather than definitive.
2. The context of management, which reminds us that curatorial stewardship is not a value-neutral activity: the fact of stewarding *this* and not *that*, or stewarding it *this* way and not *that* way, establishes an implicit imprimatur of value reflecting ideological position, privilege, and power (Schwartz & Cook, 2002).
3. The context of prior consumption, which offers transparency into informative engagement by others with similar or diverse needs, aims, and intentions.

6.1.3.2.4 AGENDUM

Support the widest range of contextual documentation

Contextual metadata and annotation provide useful explanatory commentary for interpreting and responding to preserved information objects, supported in various forms, sources, and levels of authority (see Table 6-2).

Form	Unstructured	⟵	Structured	⟶	Controlled
Origination	Consumer	⟵	Authorial	⟶	Curatorial
Authority	Anonymous	⟵	Known	⟶	Credentialed
Commitment	*Low effort*	⟵		⟶	*High effort*

Table 6-2 – Gamut of contextual documentation

(The three substantive dimensions are independent; horizontal alignment is individually relative to the low/high commitment scale only. For example, unstructured contextual documentation from a credentialed authorial source is perfectly legitimate.)

6.1.3.3 DEFINITION

Protection is the preservation function assuring authenticity, accessibility, and legitimacy

Affirmative intentions, actions, outputs, and outcomes regarding curatorially necessary/desired physical integrity, empiric validity, syntactic accuracy, and semantic reliability (collectively, authenticity); performic availability (accessibility); and plaistic relevancy and pragmatic efficacy (legitimacy) of stewarded collections.

6.1.3.3.1 COROLLARY

Legitimacy is not canonicity

Intersubjective fluidity leads to manifold rather than singular informative interpretation. Thus, preservation imperatives properly focus on facilitating opportunities for individual contingent

experiences rather than enforcing a uniform authoritarian view.

The canonic/legitimate distinction is nuanced. It is appropriate to consider the point-in-time canonicity of each of a sequence of individually transitory representations, as well as the persistent singular canonicity of semantic value. However, interpretive experience is not prone to objective canonization, but only contingent and acculturated intersubjective legitimization.

6.1.3.3.2 DESIDERATUM

Replication, fixity, and self-healing storage and network protocols

Automated assurance of physical integrity.

6.1.3.3.3 DESIDERATUM

Preserve information persistently by stewarding a (possible) succession of transitory information representations

Independent of choice of emulation or migration as a primary preservation strategy, it is unlikely that originally-accessioned manifestations of *all* stewarded materials will suffice for *all* purposes.

6.1.3.3.4 AGENDUM

Determine version retention strategy

Keeping all prior manifestations may be profligate; keeping only the current may be improvident. Preserving some information (very) well may preclude preserving other information at all. To the extent consistent with programmatic capacity, and subject to individual curatorial determination, a nominal intermediate strategy of retaining the first, previous, and current versions (i.e., 1, *n*-1, *n*) may exemplify a sustainable balance of function and aspiration.

The original version documents informative state at the point of acceptance of stewardship responsibility and provides a benchmark for all future evaluation of preservation efficacy; that is, it encapsulates the maximal set of descriptive symptomatic properties (see Section § 6.1.3.1.2. The previous version provides "oops" insurance, facilitating the straightforward ability to revert to a known acceptable state in case of inadvertent or unexpected outcomes of routine handling or targeted remediation.

6.1.3.3.5 DESIDERATUM

Content authenticity and provenance

Positive assurances regarding authenticity lie at the heart of the crucial trust relationship between preservation service providers, stakeholders, and consumers (q.v. Murray & Sternfeld, 2026).

6.1.3.3.6 DESIDERATUM

Preservation watch

Earliest possible proactive recognition of incipient risk, obsolescence, damage, and loss. Proactive prophylaxis is generally more efficient and effective than reactive remediation. Forewarned is forearmed.

6.1.3.3.7 DESIDERATUM

Preservation pathways

Planned, validated, documented, and instrumented procedures for ameliorating preservation risk.

6.1.3.3.8 AGENDUM

Operationalized machine-actionability of pathways

Automation enhances programmatic efficiency, and efficiency expands programmatic capacity (q.v. Ferreira et al., 2006).

6.1.4 DEFINITION

(Re)direction is the preservation (meta-)function fulfilling the teleological ends of preservation-enabled communication

The communicative goal of digital preservation is the transmission of past informative expression for current and future informative experience. This is couched as "(*re*)direction" rather than just "direction" to emphasize that the agential transmissive target is malleable rather than determinative, or rather, heterogeneous agent*s* rather than homogeneous agent. (Re)direction implicates projection and connection.

6.1.4.1 DEFINITION

Projection is the preservation function providing notice of the existence and availability of meaningful information

Variable policy terms may restrict or preclude access to stewarded information for legal or policy compliance. In most cases, *access* restrictions do not, and therefore should not, preclude public *description* of preserved information resources.

6.1.4.1.1 DESIDERATUM

Comprehensive catalogs, finding aids, portals, and other discovery platforms

Preserved information is only useful if known to exist and be pertinent for purpose.

6.1.4.1.2 DESIDERATUM

Standardized rights statements

Indication of high-level intellectual property status and terms-of-use (q.v., IRSWG, 2018).

6.1.4.2 DEFINITION

Connection is the preservation function providing consuming agents with meaningful information at a time and place and in a manner of their choice

6.1.4.2.1 DESIDERATUM

Adaptive rather than prescriptive user experience

Preservation processes and platforms should adapt to consumer preferences rather than forcibly prescribe consumer conformance to programmatic convenience.

6.1.4.2.2 DESIDERATUM

Preserve rendering platforms alongside the preserved data to be rendered
(q.v. Benner, 2022)

"Rendering" carries the generic technical meaning of *any* process producing a human-sensible form from an otherwise opaque digital representation; in particular, it is not restricted to visual information.

6.1.5 DEFINITION

Introspection is the preservation function of internal assessment for continuous improvement

Instrument platforms and processes for analytic measure.

6.1.5.1 DESIDERATUM

Quantitative evaluation of outputs, qualitative evaluation of outcomes

Outputs are direct results of products or services, while outcomes are the effects or benefits accruing from experiential application of those outputs (Abrams, 2025). In other words, things that are *countable* vs. things that *count*.

6.1.6 DEFINITION

Reflection is the preservation function of external transparency of and accountability for results and impacts

Analyze quantitative outputs and qualitative outcomes and report to stakeholders and other communities of practice and interest.

6.1.6.1 DESIDERATUM

Choice of strategic policy, organizational resourcing, technical platforms, and operational procedures follows from *understanding and acceptance of programmatic functions*

Pace Sullivan (1896), form follows function, that is, the *when*, *where*, *how*, and *by whom* of preservation should be determined by the *what, why*, and *for whom*.

6.1.6.2 DESIDERATUM

Avoid slavish reliance on past practice

Incumbent to a programmatic environment of often-radically shifting circumstances, keep what works and is still relevant; discard what doesn't. Received wisdom isn't always … wise.

6.1.6.3 AGENDUM

Periodic programmatic (re)assessment

Complementary abductive (e.g., top-down) and inductive (bottom-up) approaches. During investigatory stages, encourage outside-of-box thinking and (re)derivation from first-principles.

7 How Deep is the Ocean?

What is the nature of programmatic resourcing?

7.1 AXIOM

The universe of information that possibly could be preserved (far) exceeds available capacity to actually be preserved

Currently, the information universe is measured in ZBs (Wright, 2025), while preservation capacity is available at best (say, by well-resourced national memory institutions) at PB scale. We are behind before we even get started.

It is important to note that this behindedness is more a concern of quality than quantity. It has *never* been and *never* will be possible – or even programmatically appropriate – to contemplate stewarding everything. Instead, preservation necessarily relies upon informed selection as a responsible response to the ever-growing chasm between the potential, the possible, and the prudent: "It's not information overload. It's filter failure" (Shirky, 2008). This indispensable filtering is a Schellenbergian process of winnowing down the universe of the informationally valid to the curatorially valuable and programmatically tractable (q.v. Tschan, 2002).

Note that given the intersubjective nature of preservation-enabled communication, any truly-representative assessment of value is difficult to gauge in the near-term and increasingly problematic to extrapolate in the long-term as the future needs, goals, and aspirations of conceivable demographic communities become more culturally opaque.

7.1.1 COROLLARY

Given finite resource but infinite demand, any explicit decision to preserve this is an implicit decision not to preserve that

Preservation is dependent on human discretion to make the best possible, albeit often painful, allocation of scarce resources aligned with programmatic purposes and aspirations.

7.1.2 DESIDERATUM

Inclusion and reparative decolonization

Given that there is no curatorially-objective Jenkinsonian "view from nowhere" (Caswell, 2021), ensure that selection criteria embrace a position of cultural humility cognizant of the historically marginalized and underrepresented as well as the (putative) normative (q.v. Hughes-Watkins, 2018; Tai, 2021).

7.1.3 AGENDUM

Collection development and preservation policy to avoid needless duplication of effort

Distinguish between what can be done collaboratively, what should be done complementarily, and what must be done individually.

7.1.4 DESIDERATUM

Transparency of intention and result

Provide visibility into programmatic policy commitment, holdings, analytic outputs and outcomes, in the spirit of Cobweb (Abrams et al., 2016) and Keepers Registry (Tavernier et al., 2021).

7.1.5 DESIDERATUM

Engagement with and reliance upon communities on common preservation practice and concern

"If you want to go fast, go alone; if you want to go far, go together" (Whitby, 2020).

7.2 AGENDUM

Introspective identification of area, intentions, and outcomes where good enough is good enough

Responsible programmatic acceptance of external resources in order to focus internal resources in ways that uniquely add value.

7.3 AXIOM

Capability is not (necessarily) capacity

It is important to distinguish between *capability* and *capacity*, that is, knowledge of *what* to do and *how* to do it (in theory) vs. appropriation and application of the programmatic resources *necessary* to do it (in practice). Capability is accrued through aggregation of individual practitioner expertise, experience, and intuition; capacity is the totality of programmatic resource shared across practitioners.

7.3.1 DESIDERATUM

Independent of operational capacity, strive to maintain and enhance preservation capability

Accepting that capacity will be elastic with regards to ever-shifting programmatic resource commitment and allocation, continuing education and skill development in order to be proactively prepared for application in more resource-rich circumstances.

7.3.2 AGENDUM

Periodic benchmarking

E.g., DPC CAT (2025) and RAM (Mitchum & Wheatley, 2022), FORCE11 FAIR (Koster & Woutersen-

Windhouwer, 2018), POWRR Peer Assessment (Jones et al., 2025), TRAC/TDR (Donaldson, 2020), TRUST (Lin et al., 2020), whether on an informal or formal (i.e., leading towards certification) basis.

7.4 AXIOM

The condition of "being preserved" is not a binary state

Preservation success is the alignment of programmatic intention, stakeholder expectation, and operational outcome (Abrams, 2025b). The intersubjective nature of the preservation enterprise makes success a continuum of result; (relative) success for one may be (relative) failure for another.

7.4.1 DEFINITION

Success is a contextually-weighted sum of alignment factors specific to each semiotic function

For the higher-dimensional semiotic functions, this is more of an aspirational rather than operational definition, as applicable metrics have yet to be determined (Abrams, 2025b).

7.4.2 DESIDERATUM

Operationalize full-spectrum multi-valent success metrics

Continuous improvement stems from iterative application of the Plan-Do-Study-Act cycle (Deming, 1986). The Study phase relies on examination of results to understand what went wrong, what went right, and what could be done better across *all* aspects of preservation activity. Metrical summarization is important for programmatic transparency and stakeholder accountability.

7.4.3 AGENDUM

Investigate achievable metrics of semiotic accuracy, reliability, relevancy, and efficacy

Complementary with existing baseline metrics for manifest integrity and encoded validity. The intersubjective nature of information consumption suggests that success must be measured on an impractical individual basis. For tractability, programmatic evaluation should aim for general indicative assessment in terms of the common needs, goals, and aspirations of aggregate demographic communities (see Section § 6.1.1.2) rather than individual consumers.

7.4.4 DESIDERATUM

Ongoing alignment of responsive effort with ever-evolving curatorial assessment, subject to resource constraint

"Do what you can, with what you've got, where you are" (Roosevelt, 1913, p. 437). In this regard, preservation should be approached as a programmatic exercise in *satisficing*, responding to mission imperatives "by finding optimum solutions for a simplified world, or by finding satisfactory

solutions for a more realistic world" (Simon, 1979, p. 498). "*Le mieux est le mortel ennemi du bien* [the best is the mortal enemy of the good]" (Montesquieu, 1726, 630.xiii).

7.4.5 AGENDUM

Accept differential outcomes

It is not feasible, and thus, may be inappropriate to attempt to subject all information resources to the same level of stewardship care, or expect the same level of outcomes. Local success can occur (or be thwarted) individually at each semiotic dimension, as well as being considered on an aggregated global basis.

7.4.6 DESIDERATUM

Focus on (relative) preservedlikeness rather than (absolute – and thus unattainable) preservedness

By analogy to Popper's notion of scientific verisimilitude or "truthlikeness" – in which truthfulness ranges along of a continuum of explanatory rigor (Popper, 1976; Johansson, 2017) – preservation success always should be construed within a specific context of usage and its controlling parameters of curatorial/managerial intention and consumer expectation (Abrams, 2023).

7.4.7 DESIDERATUM

Embed human discernment into automated systems and processes, (re)focusing human effort on areas needing explicit human discretion

Aspire to automated baseline preservation assurance, as expected, with targeted human added-value effort, as necessary or most efficaciously deployed.

7.5 AXIOM

Preservation relies on social as well as technical architecture

Regardless of the degree of available automation, systems and procedures are properly deployed in concert with and at the behest and direction of human practitioners acting in consequence of their expertise, experience, intuition, and decision-making. Placing social relations at the center of programmatic thinking helps to guard against inappropriate – and potentially inadequate – technical reductionism.

7.5.1 DESIDERATUM

Architectural firmness, commodity, and delight [firmitas, utilitas et venustas] (q.v. Vitruvius)

Longstanding quantitative/qualitative principles governing built architecture apply equally well to the architectural perspective of the algorithmic systems, operational workflows, and human competencies embodying the preservation enterprise (Abrams, 2013).

1. Firmness corresponds to *robustness*, that is, dependability in anticipated circumstances as well as resilience and adaptability in response to changed or adverse conditions.
2. Commodity corresponds to *fitness for purpose*, that is, being effective, efficient, and sustainable in addressing contingent and contextual intersubjective needs, goals, and aspirations in a manner consistent with the principle of least surprise: "People are part of the system. The design should match the user's experience, expectations, and mental models" (Saltzer & Kaashoek, 2009).
3. Delight corresponds to conceptual, implementational, and operational *elegance* (q.v. Efatmaneshnik & Ryan, 2018), that is, seamless, frictionless, and satisfying – if not gratifying, or even pleasurable – experience.

7.6 DESIDERATUM

Ensure necessity, strive towards sufficiency, avoid superfluity
(Abrams, 2013)

"The supreme goal of all theory is to make the irreducible basic elements as simple and as few as possible without having to surrender the adequate representation of a single datum of experience" (Einstein, 1933, p. 165) or, apocryphally, "a theory should be as simple as possible, but no simpler"; "*frustra fit per plura quod potest fieri per pauciora* [it is futile to do with more things that which can be done with fewer]" (Ockham, 1340, bk. I, ch. 12); "not too big, not too small, just right" (Goldilocks; q.v. Steel, 1922).

7.7 AXIOM

Digital preservation is a "big tent" endeavor
(q.v. Negrón et al., 2024)

The effectiveness, efficiency, and sustainability of the preservation enterprise necessitates manifold perspectives, ideas, and experiments (q.v. Tracy & Hinrichs, 2017). These notes are not intended to provide a prescriptive direction to preservation effort, but rather, to stimulate community conversation – and perhaps controversy – as an aid for progress and success in the discipline and practice.

7.7.1 DESIDERATUM

Set realistic immediate goals, but ambitious intentions, and expansive long-term aspirations

If you don't ever dream big, you will only ever accomplish little. "Ah, but a man's reach should exceed his grasp, or what's a heaven for?" (Browning, 1855).

8 Envoi

A renewed conceptualization of the digital preservation enterprise encompasses the following high-level principles and recommendations, elucidated above. These are the things that *matter*, that is, are deserving of serious attention (q.v. Goldstein, 2026).

8.1 INFORMATION MATTERS

- Information is a third fundamental basis of reality, alongside matter and energy.
- Culture flourishes when information flourishes, and endures when information endures.
- Constant vigilance is necessary to ensure that bad information doesn't drive out good.

8.2 PRESERVATION MATTERS

- We strive to remember to ensure the continuity of precious human experience.
- Effective, efficient, and sustainable preservation revolves around the questions: Preserve what, from whom, when, where, how, and why? Provide what, to whom, when, where, how, why, and with what effect?

8.3 METAPHOR MATTERS

- The often-tacit metaphors conceptually underpinning a community of shared concern and practice inherently impose constraints on what is considered legitimate or even imaginable inquiry and action.
- The current controlling metaphor for digital preservation scholarship and practice is not wrong, but also not fully sufficient.

8.4 PEOPLE MATTER

- Preservation connects past informative expressions and expressors with future informative experiences and experiencers.
- Preservation is not only a substantial and instrumental exercise of technical data management, but more fundamentally, a teleological unfolding of humanistic communication across time.

8.5 CONTEXT MATTERS

- Ever-extending time horizons implicate inevitable innovative, transformative, and disruptive cultural as well as technical distance and incumbent risks.
- Informative reality is experienced idiosyncratically through acculturated intersubjective interplay of externally-focused perception and internally-reflective cognition and affection, ineluctably contingent on time, place, person, and purpose.

8.6 SEMIOSIS MATTERS

- The transmission of informative meaning across time implicates a semiotic interplay of tangible expressive signs interpreted through experiential systems of signification.
- Preservation provides summary assurances regarding bit-level substantiality, functional instrumentality, and utile teleology.
- Preservation provides detailed assurances regarding the physical integrity of reificatory manifestations; empiric validity of representational encodings; syntactic accuracy of rhetoric expressions; semantic reliability of ontological meanings; performic availability of epistemological behaviors; plaistic relevancy of associational contexts; and pragmatic efficacy of phenomenological understandings.

8.7 SCOPE MATTERS

- Preserve symptomatic as well as significant properties for demographic as well as designated communities.
- "Do what you can, with what you've got, where you are": Act responsibly in the now, plan expansively for the near-term, and aspire courageously for the long-term.

8.8 PROGRAM MATTERS

- Only an ongoing program, rather than a time-bounded project, or even series of projects, provides the ongoing commitment, advocacy, and resourcing through necessary for successful and sustainable preservation outcomes.
- Programmatic scope encompasses predilective consultation and decision-making; collective acquisition through prospective assessment and selective choice; respectful stewardship through inspective characterization, inflective optimization of structural and descriptive representation, and protective care and remediation; (re)directive information experience through projective exposure and connective fulfillment; introspective measure, analysis, and continuous improvement; and reflective transparency and accountability.
- Programmatic success is built upon engaged partnership of creative, curatorial, managerial, administrative, and consuming aegis, agency, transparency, and accountability.

8.9 SCALE MATTERS

- The information universe is too much of a good thing – and also carries along a lot of not-so-good things; it is not possible, desirable, or responsible to preserve everything.
- Drawing deliberate programmatic distinctions maximizes possibility: preserving this and not that, preserving this way and not that way.
- Optimize allocation of finite programmatic resource to preserve more things (at all) by preserving any given thing (just) enough: Approached with good intentions in good faith, good enough is good enough.

8.10 COMMUNITY MATTERS

- Preservation is a critical social good, but the inescapable constraints of finite expertise and resourcing inevitability limits the reach of any preservation program.
- Widescale community consultation, coordination, complementation, and collaboration best leverages and amplifies local capabilities and capacities for global benefit.

8.11 SUCCESS MATTERS

- Success is the substantial context-sensitive alignment of programmatic intention, stakeholder/beneficiary expectation, and realized outcome.
- The definitive, albeit more problematic, evaluative measure for preservation outcomes is enabled qualitative usability, not enabling quantitative accessibility.
- "Preservation" is not an objective binary state of final being, but rather, an intersubjective continuum of states of endless becoming.

8.12 THEORY MATTERS … AND PRACTICE MATTERS TOO

- Without robust and responsive theoretical exploration, advancement, and understanding guiding strong practice, how can we know the right things to preserve, at what right time, for what right time, in what right way, and with what right outcomes?
- Without robust and responsive practical expertise, experience, and empowerment unpinned by strong theory, how can we preserve the right things, at the right time, for the right time, in the right way, and with the right outcomes?

Acknowledgements

I'd like to offer deep gratitude to the many colleagues who generously provided trenchant criticism and suggestions, especially Sam Alloing, Julianna Barrera-Gomez, Rhiannon Bettivia, Rebecca Frank, Simone Kortekaas, Laura McCann, Trevor Owens, Tricia Patterson, Daniel Steinmeier, and Nathan Tallman.

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