001 Introduction (2026-02-28}

{Introduction - McLuhan and “living vortices of power}

In 1972 the media studies pioneer Marshall McLuhan (1911-1980) foresaw the impact of our emerging age of digital communication and memory technology when he wrote that media are “living vortices of power creating hidden environments that act abrasively and destructively on older forms of culture.”[1]

Ironically, McLuhan died the year before the IBM personal computer and the Microsoft operating system unleashed our current age of ubiquitous computing with enormous disruptions in society and the economy.

{Calls to Abandon Paper}

The astonishing speed with which computers have been embraced has prompted calls to abandon paper and transition to a completely digital information environment. For example, in 2012 the Office of Management and Budget (OMB) and the National Archives and Records Administration (NARA) announced that “the Federal Government should commit immediately to the transition to a digital government.”[2]

{Sober Evaluation of Strategies}

Our precipitous adoption of this visionary goal should be tempered through a sober evaluation of the best strategies for utilizing all the resources in our communication and memory toolbox to meet the full panoply of our information needs.

{Evolutionary Chain of Languages}

This emerging age is the just the latest in an evolutionary chain of languages that includes speech, writing, and mathematics. In *The Sixth Language* (2004), Robert K. Logan, professor emeritus at the University of Toronto, posited that “Each (language) evolved from its predecessors as new information-processing needs emerged that preceding languages could not deal with effectively. Each builds on the features of its predecessors, while adding a number of new information processing elements of its own. Each new language eventually led to an information explosion and a new set of challenges that set the stage for the next level of development and the emergence of still another form of language” [3]

{Language Modalities}

Those tasked with designing information environments must strive for a system that supports the native capacity of our minds to function in this rapidly expanding superabundance of information assets and communication technologies.

While our brains use distinct, dedicated cortical networks to process spoken,[4] [5] [6] written,[7] and mathematical languages[8] [9] [10] our minds seem to effortlessly weave all of these distinct threads the fabric of our thoughts.

{History as a Laboratory for Lessons to be Learned}

This evaluation cannot ignore the lessons that can be learned from previous introductions of new communication and memory technologies. While an imperfect window, history is the only valid laboratory for examining the potential future consequences of decisions.[11] [12] [13]

One lesson is that instead of being replaced by the newest technology, the older remain in use. Through experience gained from use the old and the new enrich each other in a larger and more complex communication and memory environment.[14]

Another lesson is that new media are initially managed as the previous ones until experience demonstrates other ways to take advantage of their unique features and power.[15] [16] [17]

As noted by Marshal McLuhan "…we all agree that 'content is king'. But what is a medium without content — only an empty shell and what is content without a medium — only a private thought. A medium needs content and content needs a medium. It is not a question of "either or" but "both and". The medium is the message and content is king!"[18]

Perhaps the most profound digital innovation is the Internet, which has moved us closer than we have ever been to the perhaps impossible goal of providing everyone access to the totality of human knowledge. Thus the quip that "The (Inter)Net comes to recycle the old media, not to bury it."[19]

{Highest Level Goal}

Tucked in the thicket of requirements established by the National Archives and Records Administration for managing federal records is the general goal that agencies must assure that "Records are available when needed, where needed, and in a usable format to conduct agency business."[20]

[1] Marshall McLuhan. See page v in the Forward of *Empire and Communications*, by Harold Innis. Toronto and Buffalo: University of Toronto Press; 1972.

[2] *Managing Government Records Directive, M-12-18*. Jeffrey D. Zients, Acting Director, Office of Management and Budget, and David S. Ferriero, Archivist of the United States, National Archives and Records Administration. August 24, 2012.

[3] *The sixth language : learning a living in the Internet age*. Robert K Logan. Toronto ; New York : Stoddart ; Niagra Falls, N.Y. : Distributed in the U.S. by General Distribution Services, 2000. See page 3/5/3.

[4] 'Brain activation for reading and listening comprehension: An fMRI study of modality effects and individual differences in language comprehension' by Augusto Buchweitz, Robert A Mason, Lêda M B Tomitch, and Marcel Adam Just. *Psychology & Neuroscience*. 2009;2(2):111-123. doi: 10.3922/j.psns.2009.2.003. PMID: 21526132; PMCID: PMC3081613. Accessed online February 23, 2026 at https://pmc.ncbi.nlm.nih.gov/articles/PMC3081613/

[5] 'Neural activity flows through cortical subnetworks during speech production' by Gregg A. Castellucci, Mac MacKay, Christopher K. Kovach, Farhad Tabasi, Jeremy D.W. Greenlee, and Michael A. Long. *Cell Reports*. Volume 45, Issue 1, 27 January 2026, 116783.

[6] 'The spatial and temporal signatures of word production components' by Peter Indefrey and Willem J.M. Levelt. *Cognition*. Volume 92, Issues 1–2, May–June 2004, Pages 101-144.

[7] 'Neurobiological bases of reading comprehension: Insights from neuroimaging studies of word level and text level processing in skilled and impaired readers' by Nicole Landi, Stephen J Frost, W Einar Menc, Rebecca Sandak, and Kenneth R Pugh. *Reading & Writing Quarterly*. 2013 Apr 1;29(2):145-167. doi: 10.1080/10573569.2013.758566. PMID: 23662034; PMCID: PMC3646421.

[8] 'A distinct cortical network for mathematical knowledge in the human brain' by Marie Amalric and Stanislas Dehaene. *Neuroimage*. 2019 Apr 1;189:19-31. doi: 10.1016/j.neuroimage.2019.01.001. Epub 2019 Jan 3. PMID: 30611876

[9] 'Cortical circuits for mathematical knowledge: evidence for a major subdivision within the brain's semantic networks' by Marie Amalric and Stanislas Dehaene. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2017 Feb 19;373(1740):20160515. doi: 10.1098/rstb.2016.0515. PMID: 29292362; PMCID: PMC5784042.

[10] 'Cortical Processing of Arithmetic and Simple Sentences in an Auditory Attention Task' by Joshua P. Kulasingham, Neha H. Joshi, Mohsen Rezaeizadeh, and Jonathan Z. Simon. *The Journal of Neuroscience*, September 22, 2021• 41(38):8023–8039. Accessed online February 23, 2026 at: https://www.jneurosci.org/content/jneuro/41/38/8023.full.pdf

[11] *Athenäum* by Friedrich Schlegel (1772–1829). Volume 1, Part 2, Fragment 80 (1798).

[12] 'Secretary of Defense James Mattis' by David Lauterborn. *Military Magazine*. December 1, 2016. Accessed February 22, 2026 at: https://www.historynet.com/interview-with-general-james-mattis/

[13] *The idea factory : Bell Labs and the great age of American innovation* by Jon Gertner. Penguin Press, New York, 2012. See page 200/1.

[14] *Origins of the modern mind : three stages in the evolution of culture and cognition*, by Merlin Donald. Cambridge, Mass. : Harvard University Press, 1991. See pages 2-3.

[15] *The sixth language: learning a living in the Internet age*, by Robert K. Logan. Caldwell, N.J. : Blackburn Press; 2004. See page 19/2/2.

[16] *The information: a history, a theory, a flood* by James Gleick. New York: Pantheon Books; 2011. See pages 411-412.

[17] *The idea factory : Bell Labs and the great age of American innovation* by Jon Gertner. Penguin Press, New York, 2012. See page 200/1/2.

[18] 'The Axiomatics of Innis and McLuhan' by Robert K. Logan. McLuhan Studies, 1991. See last paragraph in Section A.5.

[19] 'The Net comes to recycle the old media not to bury it' by Jonah Goldberg. Audio Graphics column posted May 9, 2005. Cited in"The Axiomatics of Innis and McLuhan" by Robert K. Logan. McLuhan Studies, 1991.

[20] *Code of Federal Regulations*. 36 C.F.R. §1220.32 (c) .. Accessed February 28, 2026 at: https://www.ecfr.gov/current/title-36/chapter-XII/subchapter-B/part-1220/subpart-B/section-1220.32