Reimagining Information and the DIKW Pyramid for The Age of Plasticity

An essay on Information Science by Reed Meher | February 2024

Barlow (1994) tells us that "Information is a verb, not a noun" (p.14), though he frequently refers to information as a noun in his 1994 essay, *Taxonomy of Information.* In the article, *The Origins of the Wisdom Hierarchy (2007),* Rowley relates how Ackoff (1989, see Rowley's citation) says that information is "that which is contained in descriptions, answers to questions. Information is inferred from data" (p.166). Aside from Barlow's 1994 leap away from conventional definitions of information, the leading scholars have adhered to a definition of information that is contextualized on a pyramid. Rowley makes excellent evidence of scholars leaning towards slight variations of this pyramid of DIKW. On the top of that pyramid is wisdom; followed by knowledge, information, and data (DIKW). There are some variations between scholars on how the DIKW pyramid functions and if it should contain a place for truth or not, but by and large the multitude of definitions agree about the essential structure. Barlow in 1994, though, took a wide departure into some outlandish regions of what defines information and how it might function within human populations. While I strongly disagree with most of Barlow's claims in the *Taxonomy of Information,* his claims were what crystallized many ideas I had been struggling to formulate into coherent hypothesis. Thus, Barlow is largely the reason I was able to put this essay together. I send him my gratitude for his willingness to challenge the status quo.

Thesis

It is the goal of this essay to challenge the notion of the DIKW pyramid of data, information, knowledge, and wisdom. I find that the structure of the pyramid inhibits a more natural and informed understanding of the themes, or elements, that are the pillars for the field of Information Science. I believe that a more enlightened, elemental, and natural definition of the components of the DIKW pyramid could greatly help humanity as we navigate into ever more subtle realms of information, computer science, artificial intelligence, and the regions beyond. Finally, I will comment on the long-held description of our current age as being "The Age of Information" as it relates to my proposed reimagining of the DIKW pyramid. I am rarely a fan of coining terms to describe entire epochs, especially while we are in the middle of them, but a more fitting name for our age would be *The Age of Plasticity*.

Why Reinvent DIKW

In J. Rowley's *Origin of the Wisdom Hierarchy,* Rowley provides ample evidence of the recuring DIKW pyramid from scholar to scholar. He sites, in Fig. 3 (p.168), the standard DIKW pyramid, but as it is seen according to Awad and Ghaziri (see Rowley's citations). In the Awad and Ghaziri diagram, they go on to tell us more information about the relationships between the tiers of the pyramid: they say that wisdom is "non-algorithmic" and "non-programmable", while data is algorithmic and programmable. As Rowley describes, "the higher elements in the hierarchy can be explained in terms of the lower elements by identifying an appropriate transformation process" (p.168). I agree that the higher elements are easier to explain by looking at the properties of the lower elements and how they interact, however, the notion

that wisdom is non-programmable and non-algorithmic tells us that wisdom relies on that which is beneath it to be sustained. Of course, wisdom is programmable and algorithmic: "wisdom is the ability to increase effectiveness" (Ackoff (1989), cited by Rowley, p.166). The deepest goal of building algorithms and programs is to increase effectiveness. Further, there is not much use in designating what kind of human knowing is algorithmic or not: it inhibits how we can perceive the relationships within the DIKW pyramid. I would argue that both knowledge and wisdom are almost entirely algorithmic and programmable: if they do not seem so, that is most likely because we have not yet conceived of a way to capture our knowledge or wisdom into algorithms and programs. After all, human knowledge and wisdom is gained through predictable structures of learning, ideas, trial and error, communication, etc. It is likely then, that the tools that bring us wisdom and knowledge can, in many ways, be mapped with algorithms and structures.

The other issue I take with wisdom being nonalgorithmic, but able to grow from taking in more data and algorithms, also implies that it is the role of data to act as a sort of servant to the higher elements so that those higher elements themselves might have growth and meaning. Data is beneath wisdom and serves wisdom. Wisdom doesn't have to work (nonalgorithmic, nonprogrammable), but it grows and sits atop the data, information, and knowledge it puts to work for it. Hidden in this sort of hierarchical thinking is something toxic that is far too common in western thinking. Getting at that toxicity is not the goal of this essay, so I will not elaborate *on hierarchal insidious monism* further in this essay, but perhaps one yet to come. Even that it is called a "Pyramid" is flawed, as we have reduced, in our culture, the powerful form by not even representing it accurately: it is not a pyramid, but a triangle. Adding more dimensionality to the DIKW triangle would not change its rudimentary abstraction of stacking various layers. The triangle shape also implies that there is less wisdom than data, but the notion of data and wisdom as quantities is subjective and unhelpful to the pursuit of knowledge, wisdom, or Truth because we do not have any reliable information on the true quantity of data or wisdom or knowledge within the universe.

Slapping terms on to a triangle with arbitrary delineations is something I hope is soon a thing of the past. Especially as we make more discoveries in quantum biology and the quantum properties of human consciousness. In a recent Popular Mechanics article, *Scientists Believe They've Unlocked Consciousness-and It Connects to the Entire Universe (*Lahey, 2024*),* we learn about scientists Penrose and Hameroff, who suggest that "consciousness is a quantum wave that pass through […] microtubules. And that, like every quantum wave, it has properties like superposition and entanglement".

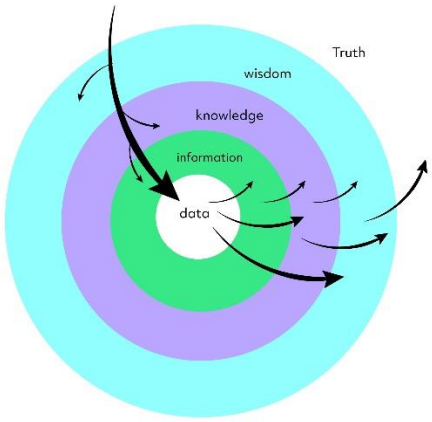
As information science arrives at the age of quantum biology, artificial intelligence, and quantum computing, it is time to step away from triangles and other limiting structures of empire-thinking when we try to describe the foundations of Information Science. Nature is far more reliable for telling us about ourselves and our information. Our thoughts need not be constrained by the social-economic role those "on top of the pyramid" wish us to be contained in, nor do we need to propagate that kind of thinking any longer. There are too many cool things to do.

What is the composition of DIKW that I am thus proposing? First, it is not DIKW, but T(DIKW), which will be clear soon. Second, a new set of elemental statements is needed to describe T(DIKW), which will set the foundation. Third, a new illustration is needed: a T(DIKW) circle. Fourth, we need metaphors to help with understanding.

I will begin with the third point, the illustration, then I will get to the first and second points, the new set of elemental statements. We will finish things off with the fourth point, metaphor, and breaking down

Barlow's (1994) *Taxonomy of Information* in the hope of further bringing home understanding of the concepts I propose to supplant the DIKW Triangle. Finally, we will get to a summary of the new name the age we live in: *The Age of Plasticity.*

The Illustration of T(DIKW)



Data is complete: It does not want. It does not know.

Information is incomplete: it does not want. It does not know.

Knowledge is incomplete: it wants data so it can create information, Information becomes knowledge. It knows *SOME* and has experienced *SOME.*

Wisdom is incomplete: it wants knowledge, information, and data… Eventually, it wants Truth.
It knows *MORE* and has experienced *MORE.*

Truth is complete: It does not want. Truth does not need to know.

More Properties of T(DIKW)

Data is in information. Information is in knowledge. Knowledge is in wisdom. Wisdom is in Truth. Everything is inside of Truth.

Information has data; knowledge has information and data; wisdom has knowledge, information, and data. Truth has everything.

All wisdom, knowledge, information, and data are within Truth. None of those elements can contain the entirety of Truth. However, since Truth has all those elements within it, Truth (truth) can be found within each element.

Truth is most closely likened to *data* because they both are complete and do not want for anything, but they are not the same thing. Data can be said to be *nothing* when it comes to human study of information, because data, without becoming information, doesn't have any discernible meaning on its own. As Rowley shared of Ackoff's definition of data: "data are defined as symbols that represent properties of objects, events, and their environment" (Rowley, p.166). I would take that a step further and say that data are the properties of Truth, but scattered --- as light is broken into myriad color when it passes through a crystal. That is why data and Truth are most closely related; in a sense, data is Truth; as colors can be said to be light, or as a bubble in the ocean can be said to be the ocean. If we follow that thought, we may conclude that data is closest to the truth and that knowledge and wisdom cannot fully know or be Truth. Their role is as collector and observer of data and as creators of information so that

knowledge and wisdom may grow from studying data and improving information, which starts to describe Truth.

When knowledge becomes very deep with information, it becomes wisdom. When wisdom becomes supremely wise, it seeks Truth and not knowledge. Yet even wisdom is still stuck in the role of the seeker. Can that which seeks Truth ever really reach it?

Breaking Barlow's Taxonomy of Information

To arrive at a better understanding of what information is and its role in the human experience and humanity's study of Information Science, I am going to "roast" Barlow's essay, *The Taxonomy of Information* (1994). Often the best way to get at what a thing is, one should look closely at what it is *not.*

"Information is an activity" and "information is a verb not a noun" (Barlow, p.14).

No, information isn't an activity or a verb. What are you going to do tonight? Oh, you thought you'd do some information? No, you didn't think that, because information isn't an activity. Information is something you gather, create, disseminate, update, or study. It is 100% a noun and not a verb, and Barlow often runs contrary to his statement that information is a verb throughout his article: so frequently, he refers to information as a noun: "information which isn't moving ceases to exist as anything but potential… at least until it is allowed to move again." (Barlow, p.14) I will get to that wild statement later, but information is clearly being described as a noun in that line. He also calls information a life form and a being that has a will to "be free". None of these are properties of a verb.

Barlow states "information is an action which occupies time, rather than a state of being which occupies physical space." (p.14). There are several things wrong with this statement. First, information is not an action. There is no basis in western thought to liken information with an action, and I still am not sure what he is talking about. Second, Barlow infers that that which occupies time does not occupy physical space. Actions occupy physical space; in fact, occupying space is what sets actions apart from thoughts. Further, anything that occupies space also occupies time, but I am not here to teach physics. Mostly, my problem is with Barlow's notion that information is experienced and not possessed. Information is both experienced and possessed, as much as anything can be said to be possessed. For example, I can get to the new restaurant in my town if I have information about it. If I possess misinformation about the new restaurant, I don't have the information, and I may not be able to find the restaurant.

Information is very much something we have. I think what Barlow is getting at, though, is the transience of information. Information, like the rest of the known universe, is transient. Information is built around data, and data is transient. Some data isn't very transient: a star lives for a very, very long time. A fruit fly does not. A star may live a lot longer than a fruit fly, but it is much more complex and time consuming for humans to learn about stars than fruit flies. We have mapped the fruit fly biology. The information about a fruit fly's biology may not change or become obsolete for a very, very long time. However, the information we have about stars and the properties of stars changes quickly: we are constantly learning new things about stars, which makes our old information about stars obsolete. In this way, we can say we have information, so it can be possessed. We can also say that information can become obsolete; so, the information we possess can cease to be information. We can call obsolete information by other names like old information, misinformation, or disinformation, but we cannot call it information.

When data transforms, there is new data. The transformation of data can lead to obsolete information. Sometimes information becomes obsolete because of the speed in which data changes. Sometimes information becomes obsolete because of the speed in which we can gather data, or because we are limited in the data we can gather or limited by our inability to understand data. Thus, sometimes, our ability to create information or discover data is limited. These properties of information, though, lead credibility to Barlow's notion that "information which isn't moving ceases to exist as anything but potential… at least until it is allowed to move again." (p.14). Throughout history, information has frequently ceased to move. For so long, the western notion that the world was flat held strong. The flatness of the Earth was said to be information at the time. When scientists and dreamers said the world was round, sometimes they were killed or imprisoned. The world said the flatness of the Earth was information, but they were wrong. The flatness of the Earth was only ever an idea that was misclassified as information. That means that many of the things we call information may be misclassified ideas without us realizing it. There is much evidence of this sort of misclassification in human history. However, once information about the shape of the earth did become known, the idea of the Earth being flat became disinformation and misinformation in many contexts. What was misunderstood, became what was knowingly or unknowingly passed off as information.

What is called information isn't always information; human ignorance is a factor in the sphere of information. Since human's cannot prove their absolute non-ignorance, all information must be taken with a grain of salt, and Barlow's idea that information ceases to exist if it isn't moving can be enlightening -- if viewed from the perspective that human's do not yet have the capability to vouch for the truthfulness of all that they call information. Barlow's idea can be misleading if viewed from the perspective that Barlow has enough scientific research behind his statement that information not in motion ceases to maintain it's properties as information and becomes a completely different thing: "potential".

Another pitfall in Barlow's article is the sheer volume of fixed properties that he attributes to information. Perhaps he is listing many properties of a certain kind of information, like his Grateful Dead song lyrics, but he makes it sound like he is defining the properties of all information, or confusing information with ideas. There are many kinds of information with many kinds of properties, but if we are to have a look at the *essential* properties of information, Barlow is far too chaotic in his claims: he states that information is a verb but also says it is a life form. He says it replicates like DNA helices (it most certainly does not) and even states that information "wants to be free". All of that is nonsense. Information is very much a noun and very much is something that belongs to the ecosystem of human thought, but it is too much to say it is a life-form. I don't even know where to start with telling Barlow that information does not reproduce itself or adapt to its surroundings.

Information may not be a verb, but there is the question about whether information is *subjective* or *objective.* In Shaw's *Foundations of Information Science and Technology,* he cites the views of Parker (1974), "who takes the objective approach" (Shaw, p.10): "Information is the pattern of organization of matter and energy" (see Shaw's citation). Shaw also shares Bateson's 1972 subjective view: information is "a difference that makes a difference [for somebody or something or from a specific perspective]" (see Shaw's citation). As we will see soon, information is both subjective and objective; it is also beyond being subjective or objective. I will give evidence to this more in the following section, but the reason I state this is because information has a multitude of properties. *Some* information is objective; *some* information is subjective. Some information is neither subjective nor objective. How? Because subjective

and objective states, like information, frequently change. Again, human ignorance is a factor. The improving of information, the disproving of information, the changing of information can change its state between subjective and objective. Often, we are left feeling unsure if certain information is objective or subjective. When information is in this in-between state, it is neither subjective nor objective; it is in transition or stasis, and knowledge or wisdom waits and searches for more data.

Rather than get lost in the mixed metaphors and baseless claims of Barlow, here we will look at some other metaphors so we can fully appreciate the fact that information is not a life-form, nor does it have a will unto itself.

Information as Water and Air

Neither water nor air are alive. They are not base elements but made up of several chemical elements. We do refer to them as elements, though, as they are part of the essential things we need to exist physically as human beings. You can't really talk about life on Earth without talking about water and air.

Let us imagine that the world of human thought also has things it needs to exist in the world of thought. The world of thought is fundamentally made up of data, information, and knowledge. The world of thought is driven by feelings and desires. Feelings and desires drive our consuming of data, our production of information, our search for knowledge, our quest for wisdom. Once we produce enough information, we feel that we have gained some knowledge. If we gain enough knowledge, we feel that we have found some wisdom. Throughout the entire process, our feelings and desires change as our physical bodies change, as the data around us changes, as our information changes, as our knowledge changes. The entire process helps our level of wisdom, or so we generally believe.

We can liken information not to a lifeform inside us, but to water and air. If there is a lifeform inside us, it is our desires and feelings, which do hunger, do exhibit changing behaviors, do adapt to their environments, do replicate, and so forth. Our desires and feelings are so much changed by the physical world that surrounds us; the food we eat, the data around us, and the information we accept, decline, create, update, and destroy. In MAYAnMAYA's 2019 YouTube video on information (*Information, 2019*), they declare that "information is what allows us to confidentially make a selection from a set of given or implied options". MAYAnMAYA makes a strong argument, but it is too limited. Helping people make selections or informed decisions is *one* property of information, but information, like water, is not so limited in the scope of how it can be used. You might as well say paper is for printing your college papers on, because printing college papers is the one example given. Obviously, paper can be used for almost infinite purposes, not just printing one kind of document.

Information, like water and air, has many properties. As our bodies need water to drink and air to breathe, so do our minds (driven by feelings and desires) need information. If a body drinks too much bad water or breathes too much bad air, the body suffers. If the mind has too much "bad" information (misinformation, disinformation, obsolete information), the mind suffers. As water can change from chemical changes around it (boil or freeze), information can change from the data changing around it (information can be right in one context and wrong in another). It is good information that one should be naked while showering. It becomes disastrous if we apply the information of when we should be naked to some other settings -- like going to the grocery store, for example.

Data is like the properties of water and air. If I hand you a glass of water and say "This is a glass of water. You can drink it." I gave you data and information. Say the water was poisoned: regardless of the state of

the water as clean or poisoned the data remains accurate, but the information does not. Why? Because it is a glass, it is water, and you can drink it. Those are all points of data that are not changed by the altering of the state of the water to include poison. It does stop being information, because if the state of the water has been changed, the state of the information has changed. Information is more than a thread of data points. When I give you the glass of water, the information I gave you is that you have permission to drink it. But if the water is poisoned and I didn't know it was poisoned, I gave you misinformation. If I knew I gave you poisoned water, then I gave you disinformation. Neither misinformation nor disinformation are information. Here we can get at an important property of information: like we need our air and water to be clean, we need our information to be clean, too. As far as data is concerned, dirty water is still water. When it comes to information, dirty water is not water; it is dirty water. Information has more responsibility to the wellbeing of people than data does because people make information out of data to help or harm ourselves, or others. Data does not need to concern itself with anything because data, while it may be gathered and studied by people, exists whether it is collected or not.

Information is not a life form, it does not have a will, and it is not a verb. Information is to the mind as water and air are to the body. It has many properties, and it is mutable. Like water and air, it can be used for many purposes: water could save one dying of thirst, or it could kill one who has fallen in a sea and cannot swim. Water can be sweetened, made bitter, and polluted. So, too, can information.

The Age of Plasticity

Every age that humans have existed could be said to be an age of information. As I have argued, information is an essential element in the world of human thought, and we have never been without a sense of having information, even if we have largely been wrong about what we classified as information. Having, creating, changing, passing, and destroying information is not unique to our age at all, so we would be better off titling our time with something more descriptive.

According to Wikipedia, the Information Age is said to have kicked off some time around the mid-20th Century. "It is characterized by a rapid shift from traditional industries, as established during the Industrial Revolution, to an economy centered on information technology" (Wikipedia, *The Age of Information*).

Some of the great moral and ethical dilemmas of our time have been marked by the spread of disinformation and misinformation. It is commonly held that with the birth of the internet came a new and vast shadow: the growing shadow of disinformation and misinformation. I argue that this shadow is neither new nor bigger (not relatively). For centuries, what was called information and truth was held in the hands of a very few. To question those few was to invite being murdered, tortured, imprisoned, exiled, or labeled as insane and dangerous. Not many could read, and the laws of most lands were given out by a select few. What was true was what they told you, and if you weren't the one passing out the "truth" you were expected to accept it, and you often had little recourse for challenging it because there were few books, all of them under lock and key, you couldn't read, and there was no one to teach you. You had no means of studying truth, challenging ideas, or creating information other than topically from your life and the system you existed inside of. Sort of an agricultural, Matrix serf-dom. It was pretty much a guarantee that nothing you were told or believed was very accurate.

Time travel to the present day. If you don't agree with something – anything – you can tell 12 million people with the push of a button. It is the atomic age of opinions. If you want someone to believe something you think is true, or you want others to think is true, you can, again, tell millions of people with the push of a button. Still, most of what you are told or believe is likely inaccurate. Yes, governments can still limit or taint the internet to prevent its population from getting information that it does not approve of, but that is not new at all. Also, people continue to be gullible, willing recipients and propagators of mis and disinformation: if it fits with our feelings and/or desires. Through the ages, too, is the staunch, often violent, rejection of information. We love information when it aligns with our feelings and desires. However, we are often wildly opposed to information if it is not in alignment with our feelings and desires.

So, the moral and ethical dilemmas of our day around the spread of dis, and misinformation are also nothing new. What then is unique about our time? It is the sudden increase in the sheer volume of ways we can interact with and produce information. We have a mighty river of new tools flowing into our hands and minds even as I write this. The tools come so fast; they often are obsolete before they even reach many people. We are birthing computer languages and software, computers, and computing devices as fast as the Mississippi River flows into the sea.

All this booming human creation and creativity, yet we have the same hierarchical relationship with information, and we are suffering for it. Thus, what we need more than anything is to reevaluate our relationship with data, information, knowledge, and wisdom. If we keep thinking in terms of DIWK triangles and relic thought constructs from long-dead empires, our minds will continue to suffer in this age of tools and creation. That is why I argue we call this age the *Age of Plasticity*. Plasticity is the quality of being easily shaped and molded, and its synonyms are softness, pliancy, flexibility, and suppleness. We can use these endlessly creative energies and technological wonders of our age to go on mass-producing mis and disinformation, just as we have done for thousands of years, or we could step up our game and move past the trolls beneath the endless bridges of comments and the pulp fiction of the lies of history.

Why are we so afraid all the time of destroying abhorrent things? John Oliver's expose on misinformation should be a beacon (*Last Week Tonight with John Oliver (HBO), 2021, "Misinformation")*. The work of Oliver and his team of journalists shouldn't be considered the conspiracy of barflies at a table telling myths about the shape of the world over pints of beer. In the episode, *Misinformation,* Oliver provides deep evidence of the propensity of our species not only to propagate misinformation, but disinformation as well; and not just to propagate it, but to imbibe "bad" information without so much as a question about the origins or citations for that information. We are so pliant and flexible when it comes to drinking the latest energy drink, sharing the latest news meme, indulging in the latest outrage… Can we not enlist that inner plasticity to orient towards sound information? What would such a reversal of human tendency mean for our future?

The best joke of Oliver's show is that, amidst the humor, is some of the finest journalism on television, with the strictest loyalty to finding data and building sound information, and yet *Last Week Tonight* is seen as mere entertainment.

We need our information to be creative and not rooted in dogma or obsolete thought-structures. What we can learn from the ruins of human civilization, we should use as a plastic medium to author new thought-structures: thought-structures that can keep pace with the advancement and proliferation of our technological tools. Within the unhampered creativity of our species, we can perhaps find the "good

water and air” we need for our minds, so that we can stay ahead of the trolls of social media and the machines of dis and misinformation rolling across all nations. I hope that if we start thinking of information as water and air, we will take better care of our minds and how we understand ourselves.

Perhaps if we take better care of the water and air of our minds, our information and data, perhaps we will take better care of the physical world. After all, if consciousness is in superposition, we only ever harm our own selves when we spread and create pollution of any kind.

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