

The Problem with the Data-Information-Knowledge-Wisdom Hierarchy

by David Weinberger

FEBRUARY 02, 2010

The data-information-knowledge-wisdom hierarchy seemed like a really great idea when it was first proposed. But its rapid acceptance was in fact a sign of how worried we were about the real value of the information systems we had built at such great expense. What looks like a logical progression is actually a desperate cry for help.

The DIKW hierarchy (as it came to be known) was brought to prominence by Russell Ackoff in his address accepting the presidency of the International Society for General Systems Research in 1989. But the actual first recorded instance of it was in 1934:

Where is the Life we have lost in living?

Where is the wisdom we have lost in knowledge?

Where is the knowledge we have lost in the information?

Those lines come from the poem “The Rock” by T.S. Eliot. (And for now we can skip over the 1979 reference in the song “Packard Goose” by Frank Zappa.) The sequence seems to have been reinvented in the late 1980s, independent of these poetic invocations.

The DIKW sequence made immediate sense because it extends what every Computer Science 101 class has taught us: information is a refinement of mere data. Information thus is the value we extract from data. But once the idea of information overload started taking root (popularized in Alvin Toffler’s 1970 *Future Shock*), we needed a way to characterize the value we extract from information. So we looked for something that would do to information what information did to data. Ackoff suggested knowledge as the value of information, and we collectively nodded our heads.

But, the info-to-knowledge move is far more problematic than the data-to-info one. Ask someone outside of the circle of information scientists what “information” means and you’ll find that it’s a hollow term. It thus was available for redefinition. But “knowledge” is one of the most important words in our culture, with a long and profound history. In the DIKW hierarchy “knowledge” slips its mooring, and that matters.

So, what is “knowledge” in the DIKW pyramid? For Ackoff, knowledge transforms “information into instructions.” Milan Zeleny, who came up with the hierarchy a couple of years before Ackoff, says that knowledge is like the

recipe that lets you make bread out of the information-ingredients of flour and yeast (with data as the atoms of the ingredients). The European Committee for Standardization's official "Guide to Good Practice in Knowledge Management" says: "Knowledge is the combination of data and information, to which is added expert opinion, skills and experience, to result in a valuable asset which can be used to aid decision making."

The emphasis in all these cases is on knowledge being "actionable" because of the business context, and on knowledge being a refinement of information because that's how we extracted value from data. That may be a useful way of thinking about the value of information, but it's pretty far from what knowledge has been during its 2,500 year history. Throughout that period, Plato's definition has basically held: Knowledge has been something like the set of beliefs that are true and that we are justified in believing. Indeed, we've thought that knowledge is not a mere agglomeration of true beliefs but that it reflects the systematic and even organic nature of the universe. The pieces go together and make something true and beautiful. More, knowledge has been the distinctly human project, the exercise of the highest and defining capabilities of humans, a fulfillment of our nature, a transgenerational treasure that it is each person's duty and honor to enhance.

But, nah, we needed a word to explain what good comes from our massive investment in computers, so we grabbed ahold of "knowledge" and redefined it as we had to. Then we threw "wisdom" into the mix. Bah.

And humbug. The real problem isn't the DIKW's hijacking of the word "knowledge" but its implication that knowledge derives from filtering information. It doesn't. We can learn some facts by combing through

databases. We can see some true correlations by running sophisticated algorithms over massive amounts of information. All that's good.

But knowledge is not a result merely of filtering or algorithms. It results from a far more complex process that is social, goal-driven, contextual, and culturally-bound. We get to knowledge – especially “actionable” knowledge – by having desires and curiosity, through plotting and play, by being wrong more often than right, by talking with others and forming social bonds, by applying methods and then backing away from them, by calculation and serendipity, by rationality and intuition, by institutional processes and social roles. Most important in this regard, where the decisions are tough and knowledge is hard to come by, knowledge is not determined by information, for it is the knowing process that first decides which information is relevant, and how it is to be used.

The real problem with the DIKW pyramid is that it's a pyramid. The image that knowledge (much less wisdom) results from applying finer-grained filters at each level, paints the wrong picture. That view is natural to the Information Age which has been all about filtering noise, reducing the flow to what is clean, clear and manageable. Knowledge is more creative, messier, harder won, and far more discontinuous.

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