

# The Relevance of Data, Information, and Knowledge

## Introduction

A recent essay in my TMGT 7200 Management Information Systems for Transportation online graduate class for Spring 2007 provoked me to write this note exploring the meaning of relevance of data, information, and knowledge.

## Data, Information, and Knowledge

Data, information, and knowledge are not identical.<sup>1</sup>

SUNY Maritime

II. Information Management and Technology

### The difference between data, information and knowledge

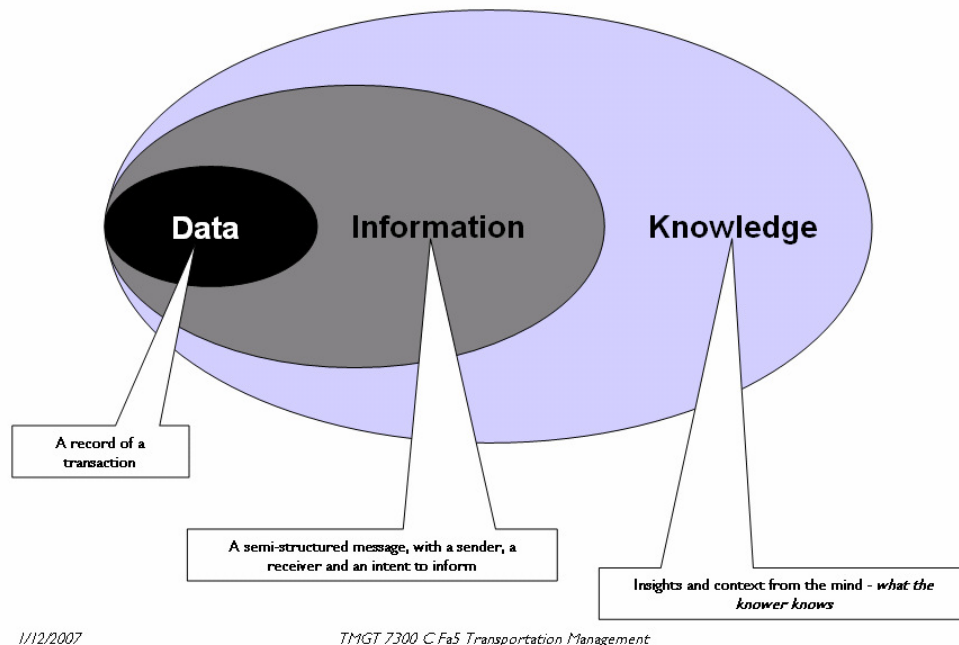


Figure 1 The Difference Between Data, Information and Knowledge

Some points:

1. Data is a prerequisite for information and information is a prerequisite for knowledge. This places a premium on the correctness of the data. Data are attributes of objects (e.g., age of a person, location of a shipment).
2. The cost of acquisition of data, and subsequent development of information and knowledge increases as one moves from the left to the right in Figure 4.

<sup>1</sup> J. Drogan, *II. Information Management and Technology*, August 2005

3. The value of decisions made on the basis of data, information, and knowledge increases as one moves from the left to the right in Figure 4.
4. Human involvement in an information system increases as one moves from left to the right in Figure 4.
5. The skills and experience required of the human to be an effective participant in an information system increases as one moves from left to the right in Figure 4. The apprentices are to the left, the adepts to right.

## Relevance

Consider the following sequence.<sup>2</sup>

1. What business decisions must be made and why? Here we are seeking to write declarative sentences that look something like "We need to make a decision about ... because it will affect how we ..." These need to be decisions of significance to the firm.
2. How will these decisions be made and why? By how I mean the general approach to making the decision. For example, a decision on which container to move next will be based upon a) the value of the goods to the shipper and 2) the value of the shipper to the organization. It's useful to also write declarative sentences to help answer these questions.
3. What data is required and what will be its source?

Relevance is a measure of the ability of the data, information, and knowledge to support the process for making decisions.

1. Is there a strong relationship between the data, information, and knowledge and the process for making the decision?
2. Is the data, information, and knowledge available within the decision window?

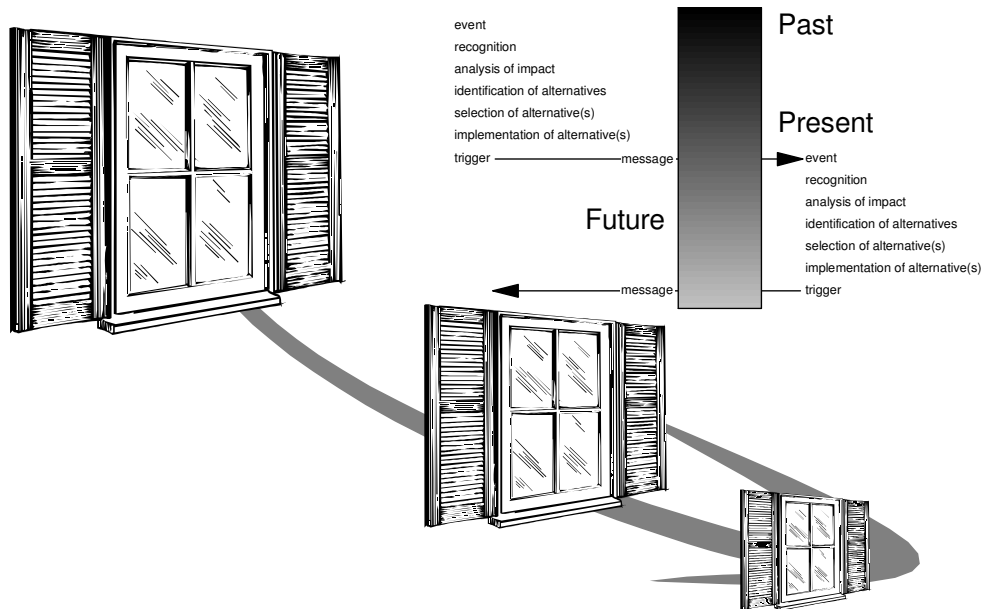
### *The Decision Window*

A few words are in order regarding the decision window.<sup>3</sup>

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<sup>2</sup> J. Drogan, Note on Building a Management System, January 2005

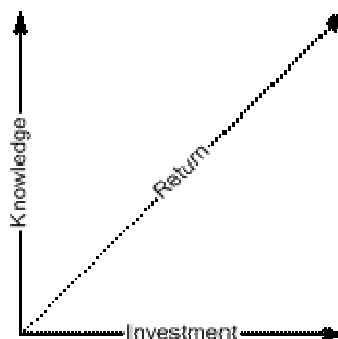
<sup>3</sup> J. Drogan, Ideas to Initiatives to Business Value, March 1999



**Figure 2 Decision Window**

The decision window is opened by the initial event and closed by the resulting outcome. Any intervention to change the outcome must come within this window. The windows continue to grow smaller due, I think, to the ubiquitous of data, information, and knowledge; pervasive global communications (always on, always connected, always transacting<sup>4</sup>); the speed at which business is conducted; and, last but not least, the embracing of risk and uncertainty as representing opportunities for competitive success.

I include here a portion of the contents of an e-mail exchange on this subject which may shed additional light on my thinking.<sup>5</sup> The original material is in *italics*. I have added additional explanations into the original e-mail in regular typeface.



**Figure 3 Investment in Developing Knowledge**

*In this case I'm suggesting that an investment in time/effort results in the acquisition of knowledge and a subsequent return on the investment through the actions predicated on that knowledge.*

The greater the investment, the greater the knowledge acquired, the greater is the expectation for return.

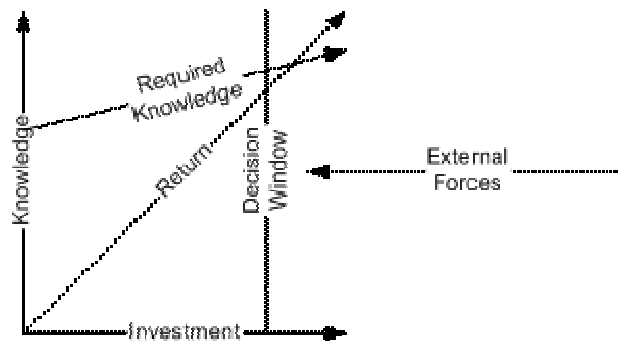
<sup>4</sup> J. Drogan, *How to Use Computers and the Internet in Daily Transactions*, November 2003

<sup>5</sup> J. Drogan to D. Livingston, *RE: Homer, Great Books and Modern Life*, December 28, 2006

The return line is anchored at the origin and rotates counterclockwise or clockwise depending upon one's capacity (greater or lesser, respectively) to absorb and internalize the knowledge. The length of the line is a function of the commitment one makes to the investment. Lifetime learning is represented by long lines.

One could, I suppose draw, at worst, a horizontal line indicating the level of knowledge required to resolve certain issues. At best, I suspect this line probably rises as one goes from left to right. The three box model was satisfactory at one time, but the five box model is to be preferred, and someone has had the temerity to suggest five is not enough.<sup>6</sup>

The investment line suggests that there is a limit (i.e., one cannot invest an infinite amount for an indefinite time) to the amount of investment that one is willing (boredom arrives) or able (the decision window has closed) to make.



**Figure 4 Required Knowledge and the Decision Window**

In the second case, external forces are tending to push the limit set by the decision window to the left. Unless one changes the return line one will, over time, have less and less knowledge available to resolve increasingly complex issues. I think the decrease in the size of decision windows is an unstoppable force. The only thing that one can do to cope is to rotate the return line counterclockwise.

By the way, it ought to be obvious I'm making this up as I go along. I'm not exactly sure where this is going, but I hope to come back and remove this paragraph.

Hence, what we need is to find a way to rotate the return line counterclockwise. I understand the line may shorten (an implication to be worked through later).

I see only two ways to do this. Improving the K-12 educational system, at a minimum, but also extending this to improvement into higher education (at least to the Masters level). We have discussed this at some length.

The second way is to improve collaboration. Technology helps here, but there is also a change in mind set required. My experience is that you can dump a lot of pretty smart people into the SIDAL process, but they will not necessarily form a high performance team. The notion of collaboration ought to be on our discussion list.

Oops, a third way pops up. Increase the return by focusing only on relevant knowledge. That, of course, is what fact-based hypothesis-driven reasoning is all about. And this calls into question the value of the Great Books (this alone ought to provoke some sort of response from you). Eruditeness may, in fact, be a burden in the future world. On the other hand, those that traffic in imagination, to whom you refer in the last part of your note, may be of great value.

As to the matter of boredom, the option here is to find a way to make the seemingly boring actually exciting. That's what good teachers are all about. I think we can agree we have too few of these.

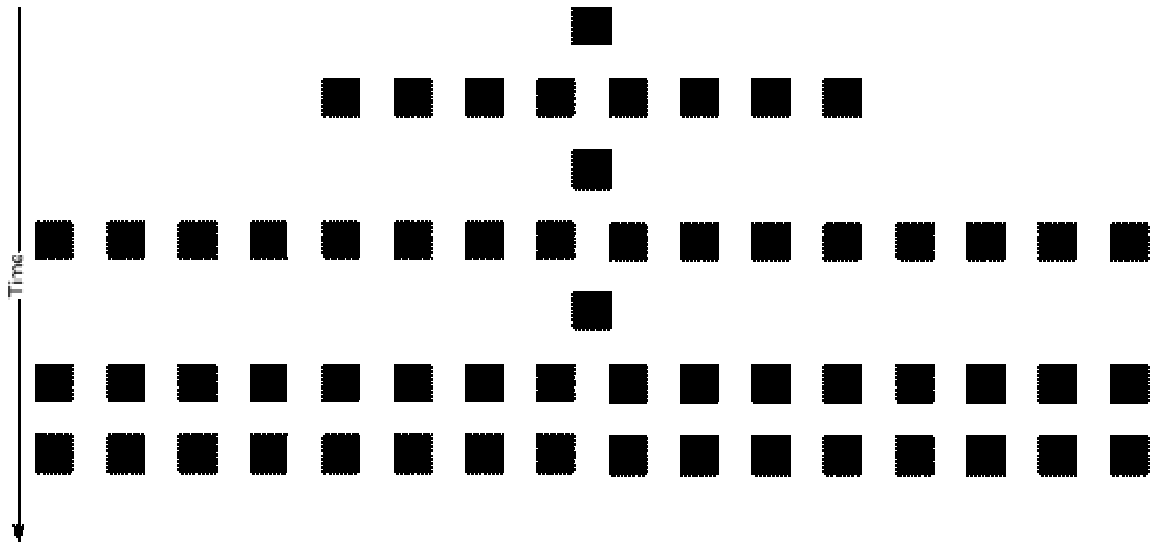
<sup>6</sup> The three box and five box models are supply chain descriptions. I have suggested that the five box model is insufficient.

However, I think there is and will always be the need for the person that understands the picture to be made from all the little pieces. Where are they to be found? How are they to be nurtured and retained?

Maybe Homer and Great Books do not fit with Modern Life? This may be seen as in opposition to what I have often maintained prior to this note. Indeed, I think it may well be. If Homer and the Great Books can be considered as representative of the knowledge of the person that understands the picture to be made from all the little pieces, then I what I am leading towards [is] this person as the composer, orchestrator, and maestro (COM; acronym is required because I sense I'm going to come back to this idea). We need more of these.

And we need the members of the orchestra, the specialists, for which Homer and the Great Books are not what is required.

Now the following should come as no great surprise.



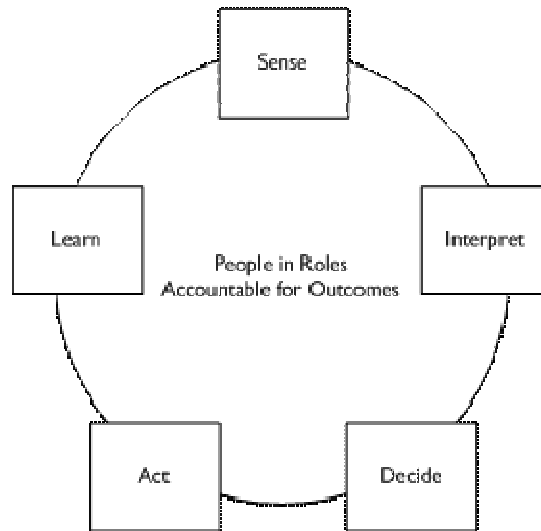
Over time, as technology and our understanding of collaboration has developed, the COM (the single box) can direct an increasing number of specialists. Collaboration is not represented, in my mind, by blogger babble, but rather by such things as open source and wikipedia. The COMs must understand and must apply Homer and Great Books while the specialists should be content with the Red Books (IBMese).<sup>7</sup>

What seems so straightforward, blissful even, is set upon by culture, Maslow's Hierarchy, myopia, and all the related diseases that hinder our ability to pay attention, to listen and hear, to understand, to practice tolerance, to accept and, ultimately, to work in a more positive way for the common good. There are, as you have often pointed out, cures for the diseases if only the patients will be willing to take the waters

So there you are. It's all about incentive. Unfortunately, incentive generally arrives when one is under duress (think IBM in the early 90s). In the pace of today's and tomorrow's world that may well be too late. It becomes harder and harder to get on top and stay on top of the wave. I'm pretty sure that we in higher education are not dealing with this as effectively as we ought.

All this does not, in my mind, obsolete SIDAL.

<sup>7</sup> By Red Books I meant specific, detailed expertise.



**Figure 5 The SIDAL Loop**

*It does suggest to me that we ought to moving towards structures characterized by a (large) number of small, fast SIDAL cycles operating in a collaborative, associative manner (much like the brain?), all under the direction of COM.*

*I think I can see this and how it would work. Doubtless there are existing examples of this construct. The critical issue is getting from here to there. I think this requires significant behavioral change on the part of a significant number of people. Ah, yes, there we have that word again – change.*

The argument here is our notion of relevance of data, information, and knowledge may very well be changing. That is, for the reasons given above, we may need to accept less relevance (accuracy, precision, relationship to need, timeliness or completeness) because we must act before the decision window closes. Our decision processes may require more collaboration because of the breadth and depth of the relevant data, information, and knowledge.<sup>8</sup>

## ***Understanding***

One of my students wrote:

“One must be cognizant of words being used as some words have multiple meanings and understand which one is being used or to use. Some words carry a different meaning between different countries. For example: My office in the U.S. refers to the word demurrage free-time and detention free-time as terminal free-time and equipment free-time, respectively. In the Callao, Peru office, they refer to demurrage free-time and detention free-time as equipment free-time and detention free-time, respectively.”<sup>9</sup>

This brings me to principles of communication.

1. The grammar and syntax of the messages being exchanged are understood.
2. The information communicated in the messages is relevant.
3. The medium of communication is acceptable.
4. There is a desire to communicate.
5. There is confirmation of understanding.

<sup>8</sup> Drogan's First Law: Know what you know, know what you don't know, and know who knows what you don't know.

<sup>9</sup> J. Kou, TMGT 7200.1 Written Assignment, January 11, 2007

The data, information, and knowledge required to make decisions has its roots in communication. Language and culture become major hurdles to assuring that the parties communicating have a common understanding of the data, information, and knowledge.

I don't think you can be comfortable with judging relevance in the absence of understanding. Further to this point, while researching for this note, I uncovered the following.

#### *Summary*

*Relevancy assumes a critical importance in control system operation because of the large amount of information available. The information deluge impacts the following areas: If information is presented at too high a rate or in too large blocks, the operators may not comprehend it. If useless data is often resented in a given display, the operators may ignore all data presented by that display. If the context of the data is not presented, the data may be meaningless to the operators. If the control and display systems are not properly designed, peaks in the message generation rate may choke the system. This paper describes the techniques in use and under development at the Clinton P. Anderson Meson Physics Facility for increasing the relevance of data both for real-time operations and for long-term analysis of accelerator performance. Data sifting and organization for presentation and for compact storage is discussed.<sup>10</sup>*

The message here is to be heeded.

## Corroboration

*Cor·rob·o·ra·tion*

*n.*

*[Cf. F. corroboration.]*

*1. The act of corroborating, strengthening, or confirming; addition of strength; confirmation; as, the corroboration of an argument, or of information.*

*2. That which corroborates.<sup>11</sup>*

No longer can we simply accept what we see and hear at face value. Confirmation of the facts is becoming increasingly important. But confirmation takes time and I have previously argued that that time is an increasingly critical resource.

"I believe that we're about to witness what may turn out to be the last competitive frontier business will see. It's going to be a war over the one priceless resource. Time. And when it comes, trust may turn out to be the best investment anyone's made."<sup>12</sup>

Can one trade corroboration for trust and thereby better cope with the relentless move of the decision window line to the left in Figure 4 Required Knowledge and the Decision Window on page 4? And if one can't, what is the alternative for coping?

James Drogan  
January 13, 2007

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<sup>10</sup> G. R. Swain, [Increasing the Relevance of Data](http://epaper.kek.jp/p75/PDF/PAC1975_1082.PDF), IEEE Transactions on Nuclear Science, Vol. NS-22, No.3, June 1975, [http://epaper.kek.jp/p75/PDF/PAC1975\\_1082.PDF](http://epaper.kek.jp/p75/PDF/PAC1975_1082.PDF) [January 21, 2007]

<sup>11</sup> [Webster 1913 Dictionary](http://www.answers.com/topic/corroboration). Patrick J. Cassidy, 1913. Answers.com 14 Jan. 2007. <http://www.answers.com/topic/corroboration>

<sup>12</sup> Jim Kelly, CEO of UPS, Remarks to the Commonwealth Club of San Francisco & Oakland Chamber of Commerce, February 23, 2000.