

# Examining the KO Roots of Taylor's Value-Added Model\*

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**ABSTRACT:** The Value-Added Model, as developed by Robert Taylor in his 1986 monograph *Value-Added Processes in Information Systems*, has been highly influential in the field of library and information science. Yet despite its impact on the broader LIS field, the potential of the Value-Added Model has gone largely unexplored by knowledge organization (KO) researchers. Unraveling the history behind the Model's development highlights the significant contributions made by studying the work practices of professional indexers. In light of its foundation on KO praxis, this paper reexamines Taylor's Model as a robust framework for evaluating knowledge organization systems.

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## 1.0 Introduction

This paper considers how the Value-Added Model proposed by Taylor (1986) has important roots in the theory and practice of knowledge organization (KO). The purpose for examining Taylor's model in light of its KO origins is twofold: first, to give due credit for the influence of KO praxis on the development of Taylor's model, and second, to suggest how the model might effectively serve as a tool for evaluating KO systems. Furthermore, this examination of the Value-Added Model is motivated by Taylor's central focus on the *user* and the *information use environment*. The growing trend of social classification (i.e., user-generated indexing of Internet resources) only serves to highlight the need for a user-centered perspective on KO evaluation.

While Taylor's model has been influential in library and information science (LIS) generally, it has not garnered particular attention from KO researchers. By focusing on the genesis of the Value-Added

Model, this paper attempts to reframe Taylor's contribution. For over twenty years the Value-Added Model has been woven into the broad fabric of LIS; pulling on some of those same threads reveals how North American KO helped to shape the overall pattern.

In the sections that follow this paper provides a general overview of the Value-Added Model and addresses its general applicability across various information systems and contexts. The focus then shifts to the model's origins in an NSF-sponsored study of abstracting and indexing services (Taylor 1983). Taylor's analysis of the abstracting-and-indexing process, which included in-depth interviews with A&I professionals, provided the foundation for the development of his Value-Added Model. In this respect, the A&I enterprise can be regarded as a quintessential value-adding process. And given the centrality of indexing to any KO endeavor, this paper suggests that Taylor's Value-Added Model is particularly well-suited to evaluate KO processes.

## 2.0 Background and Context

In order to situate the Value-Added Model in its historical context, it is helpful to consider the background of its creator. Robert Saxton Taylor (1918-2009) studied history as an undergraduate at Cornell University. Soon after graduation he was drafted into the U.S. Army, where he served as a member of the Army's Counter Intelligence Corps from 1942 to 1947. Under the GI Bill, Taylor enrolled at Columbia University, earning a master's degree in library science in 1950. After earning a Fulbright in 1956, he went on to work in various teaching and administrative capacities: librarian, professor, and director of the Center for the Information Sciences at Lehigh University (from 1962 to 1967), and later professor and director of the Program in Language and Communication at Hampshire College (from 1967 to 1972).

With his experience in military intelligence, coupled with his training in librarianship, Taylor was uniquely suited to make contributions to the burgeoning information science field in North America. In 1968, the very same year that the American Documentation Institute became the American Society for Information Science, Taylor served as that organization's president. It was during this same time that he published his study on question negotiation in the reference process (Taylor 1968). That landmark study was among the first in the field to emphasize a distinctly user-centered perspective, and remains one of the most cited works in LIS (Eisenberg and Dirks 2008). Taylor went on to serve as dean at Syracuse University from 1972 to 1981, where he instigated the renaming of the School of Library Science into the School of Information Studies. The change to the name of the school in 1974 reflected Taylor's discerning vision for an expansive, yet distinct, information field. His varied contributions were recognized in 1992 when Taylor was honored with the Award of Merit from the American Society for Information Science (now ASIS&T).

His research on the reference interview process established Taylor as a champion of the user, and his later work did not veer from that path. Focusing on people, and the ways they go about using information, remained central to Taylor's development of the Value-Added Model in the 1980s. His focus on users yielded a distinctly ecumenical perspective on information practices. In the preface to *Value-Added Processes in Information Systems*, Taylor (1986, ix) described his book as:

A synthesis of what it is we as information people do .... In focusing on the use of information, we can look across systems at similarities, rather than at differences caused by varying technologies, disciplinary traditions, and a need to protect a turf.

These are not merely niceties doled out in the introduction; Taylor takes pains to generalize his terms, and he does so by focusing ever on the user. His framing of the concept of system is illustrative of the point. For Taylor (1986, 10), a system can be almost anything: ranging from "entirely machine based" to "entirely human based"—so long as it functions "to provide chunks of information to some set of potential users."

The Value-Added Model has been widely cited in the literature: a search of cited-references using ISI Web of Knowledge in June 2009 retrieved 174 citations to the 1986 text; a similar search of Google Scholar identified 320 citations. In addition, Taylor (1986) has been compared with Dervin and Nilan (1986) as among the "most clearly articulated" voices of the "user turn" in LIS (Rosenbaum 2003). When not being used as a shorthand for a user-based approach in information science research, Taylor (1986) has been cited in the literature of information systems design, and has also crossed into MIS and computer science journals. Such broad adoption in the research literature can be considered (at least in part) a function of the generalizable nature and applicability of the Value-Added Model. In much the same way that Taylor frames the notion of system on behalf of the user, the entire notion of value itself is placed squarely on the user.

The Value-Added Model hinges on the idea that people interact with systems within a context: what Taylor calls the information use environment. Information systems either help users to perform better (or not), but "better performance" is defined with reference to the user's context (Taylor 1986, 55). Taylor, therefore, intentionally defines enhancements to information systems with respect to addressing the needs of the users of information systems. The concept of the information use environment is significant, because it increases the model's inherent flexibility. Differing information use environments will value the same enhancements differently. Taylor's model is still cited for the conceptual contributions it makes to notions of value (e.g., Stvilia et al 2007), and contextualized use (e.g., Choo 2009).

### 3.0 Overview of the value-added model

As part of the discussion of the Value-Added Model, Taylor first presents his readers with the Value-Added Spectrum. Figure 1 reproduces the Value-Added Spectrum (originally Figure 1-1 in Taylor 1986, 6), with four groups of processes, stacked one on top of the other. At the base of the diagram are Organizing processes, upon which the other three groups build. Working up the Value-Added Spectrum from Organizing processes, Taylor situates Analyzing processes, Judgmental processes, and (at the top level) Decision processes. Each of these four groups is supplemented with “examples of the activities supporting that particular process” (Taylor 1986, 5-6). The Spectrum includes an axis that parallels the four groups of processes; from the bottom up, they are Data, Information, Informing Knowledge, Productive Knowledge, and Action.

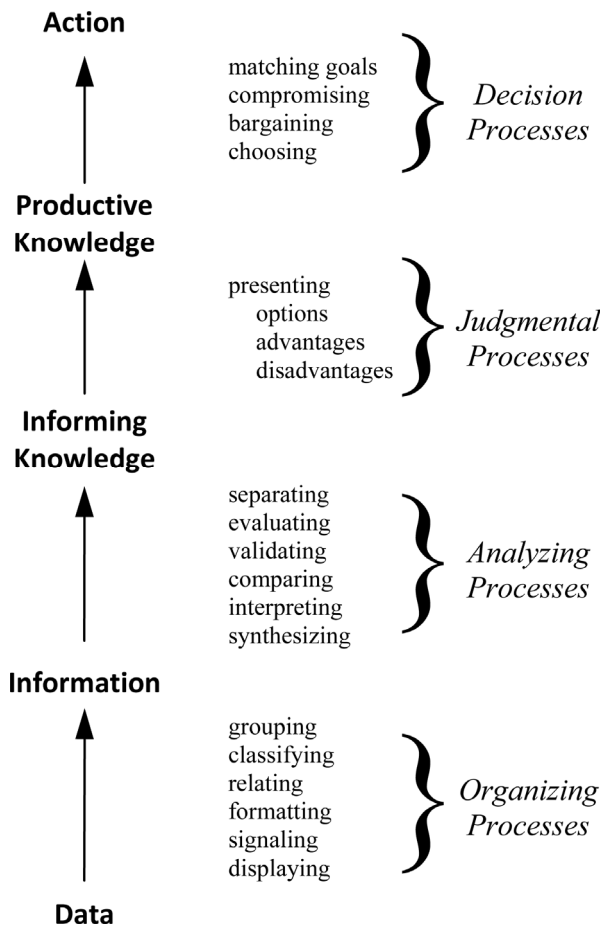


Figure 1. The Value-Added Spectrum (Taylor 1986)

Some of the assumptions behind the Spectrum are discussed later in this paper, but it is worth noting one

matter directly. Researchers in KO can validate, resoundingly, that activities such as grouping, classifying, or even formatting all require decision-making processes in and of themselves. The Value-Added Spectrum does not malign classifying as something that is a sub-decision, or anything similar. Rather, the Spectrum merely articulates how the system activities (in the center) are related to a class of processes (on the right).

Taylor’s model is most typically associated with the explication of six user criteria and the 23 corresponding values added. Table 1 reproduces the framework of user criteria and values added (Figure 4-2 in Taylor 1986, 50). Six broad user criteria—ease of use, noise reduction, quality, adaptability, time saving, and cost saving—represent dimensions of a user’s evaluation of information systems, and serve as rubrics for the particular values added. As pointed out by Eisenberg and Dirks (2008, 3), the “relative priority of one or another criteria will depend on the person, situation, needs, setting, and other user-centered aspects.”

In the center column, Taylor (1986, 51) refers to the 23 values added as the “interface”—“these are the values added by the system which aid customers in matching their needs.” Some of the added values are clearly tangible (e.g., index terms or faster delivery), while others are less so (e.g., accuracy or reliability). Such ambiguity is perhaps to be expected, given Taylor’s ambitious goal “to construct an early model of a complex human activity, a model that would be useful in the description of information-providing systems of any type, and eventually in their design” (Taylor 1986, 54).

The final column, on the far right, is labeled “system.” These processes and features are sample activities that exemplify Values Added in the center, which in turn are associated with the user criteria in the first column.

### 4.0 Taylor’s study of abstracting & indexing operations

Taylor makes it clear that the 23 values were derived through a variety of means – including a review of the information science literature as well as consultation with information professionals. But the empirical work behind generating the 23 values was largely carried out during an NSF-sponsored study (Taylor 1983) of the abstracting and indexing (A&I) process. In his monograph, Taylor (1986) presents the study of the A&I process within the fuller context of his Value-Added Model. The intimate link between the

USER CRITERIA OF CHOICE	INTERFACE (Values Added)	SYSTEM (Value-added Processes: Examples)
Ease of Use	Browsing Formatting Interfacing I (Mediation) Interfacing II (Orientation) Ordering Physical Accessibility	Alphabetizing Highlighting important terms
Noise Reduction	Access I (Item identification) Access II (Subject description) Access III (Subject summary) Linkage Precision Selectivity	Indexing  Vocabulary control Filtering
Quality	Accuracy Comprehensiveness Currency Reliability Validity	Quality control Editing Updating Analyzing and comparing data
Adaptability	Closeness to problem Flexibility Simplicity Stimulatory	Provision of data manipulation capabilities Ranking output for relevance
Time-Saving	Response Speed	Reduction of processing time
Cost-Saving	Cost-saving	Lower connect-time price

Table 1. User Criteria and Values Added (Taylor 1986)

A&I process and the Value-Added Model is perhaps best understood as an overall commitment to the “praxis of information” (Taylor 1986, 2).

By focusing on praxis, Taylor respectfully acknowledges the many achievements of LIS professionals: not only the nascent database systems of the 1980s, but also the centuries-old practices of print-based libraries and archives. At several points in the introductory chapter, Taylor reiterates how information systems do, to a large degree, work. His statements are not meant to obviate the need for further improvements to information systems; instead Taylor (1986, 3) points to the need to rigorously describe “what it is those systems do and how they do it.” Taylor offers an analogy to engineering; the steam engine provided wide utility and functionality for centuries before science could fully explain the thermodynamic principles behind its workings. Information phenomena are vastly complex, and so it is praxis where Taylor focused his attention. A&I offered Taylor (1986, 96) “a

particular and well-defined operation in the information life cycle” where he could consider how various stages added value to “aid a user in making choices.”

Taylor’s study of A&I operations is the central focus of his sixth chapter (Taylor 1986, 96-125). He conducted interviews with A&I professionals, collecting approximately 60 hours of taped discussions; an appendix provides the detailed list of questions (Taylor 1986, 238-242). By talking through the A&I process with experts in A&I praxis, Taylor allowed interviewees to identify numerous points in the process where value was added. Interviewees were also engaged in identifying the particular values being added. This robust exchange between researcher and A&I practitioners allowed patterns to emerge: showing “where and how a specific value was added or strengthened” in the overall A&I process (Taylor 1986, 97).

The process of A&I was sequenced along eight phases: 1) acquisitions, control, and claiming, 2) cita-

tion development, 3) citation augmentation, 4) indexing, 5) abstracting, 6) editing, 7) formatting, and 8) dissemination. Taking the first phase as an example, Taylor's (1986, 106-107 emphasis original) interviews highlighted Reliability, Comprehensiveness, and Selectivity as the major values added.

*Reliability* has to do principally with consistency of input, or with known coverage of a subject. *Comprehensiveness* represents a value in those services whose mandate is total coverage of a subject, and whose clients come to value such coverage. *Selectivity* is the converse of comprehensiveness, and has value when the clients want a filtering process, and do not want coverage but solutions.

The claiming process added the value of Currency and strengthened the value of Reliability. Taylor's study of A&I operations continues in this fashion throughout the eight phases. The data is reported not only in terms of "values added" during a particular phase in the A&I process, but also as "values intensified." This latter designation is necessary to capture the cumulative effect of value-adding processes in information systems: when a specific value had already been added during an earlier phase, Taylor characterized its subsequent additions as "strengthened" or "intensified." The opposite effect is also possible: when "no method for claiming" was reported, the values added were Minus comprehensiveness, Minus currency, and Minus reliability.

### 5.0 No value without KO?

Keeping in mind the important influence of A&I operations in the development of the Value-Added Model, let us turn attention back to the Value-Added Spectrum (in Figure 1). The Spectrum seems to build on assumptions that are crucial for KO researchers. First there is the notion that "organizing processes" are fundamental to more complex information tasks. In other words, higher-order information processes are not possible without the more essential organizing processes at the base of the Spectrum. But this linearity obscures dependency. Since the higher-order processes (analysis, judgment, and decision) rely and build upon each successively preceding phase, the higher-order processes can be considered as more fragile or volatile. All stages beyond the first are at the mercy of the preceding phases, and hence beholden to the foundational KO processes.

In a manner of speaking, this problematizes precisely where Taylor indicates the most value resides. For while the layers upon layers of value needed for Decision Processes are not inconsequential, the argument can be made (via first principles) that the root organizing processes have been largely undervalued, given the reliance of the entire enterprise on their soundness or efficacy.

Furthermore, the Spectrum can be viewed as obscuring the very real and important analysis, judgment, and decisions that are needed to maintain organizing processes. Given Taylor's esteem for information praxis, and his careful, respectful treatment of the A&I process, it would appear that such a slight is unintended. Rather, the Spectrum reflects the realities of a user-based perspective: where people place a higher value on information that has been more thoroughly tailored to their decision context.

Taylor's Value-Added Spectrum would seem to present an opportunity for KO research: articulating how a stable base of organizing processes can ultimately support a wide range of information use environments. At the same time, KO research must grapple with designing and maintaining organizing processes that serve both as solid foundations for, and flexible inputs to, later processes.

### 6.0 Intellectual Technologies in the Value-Added Model

It should also be noted that the Value-Added Model does offer an additional perspective relevant to the sphere of KO. Taylor (1986, 10) employs the rubric "intellectual technologies" to encompass the related phenomena of indexing, classification, and systems analysis. Taylor discusses intellectual technologies in two distinct but complementary ways. First, intellectual technologies form a component in the process of designing information systems (Taylor 1986, 24-29). Later, intellectual technologies serve as a focal area in an overall vision for professional education in an emerging information discipline (Taylor 1986, 208-213). Intellectual technologies are specifically described as (Taylor 1986, 212, emphasis in original):

the methods used to organize information for storage, retrieval *and* for communication in textual form, graphic structure, and visual image. These technologies are content driven, tempered and informed by the ways that users (a) structure their information environments and (b) make use of information. These will range from

the design of a data base management system to the design of a form used to record an order...from the structure of accounting systems to the design of library classifications. These all require a type of organization – a structuring of the information content, whether the purpose is for storage or for communication.

This broad perspective on the structuring of information offers several possible paths for KO researchers. Taylor's characterization of intellectual technologies could serve as a point of departure for augmenting and extending current definitions of Knowledge Organization Systems (cf. Hodge 2000; Zeng 2008). With its particular emphasis on users creating information structures, Taylor's notion of intellectual technologies could serve as a lens to analyze the various user-driven folksonomy structures emerging in the current Web environment (cf. Weinberger 2007).

### 7.0 Evaluating KO processes with the value-added model

Taylor's contribution in the Value-Added Model is a robust framework for considering an enormous range of information practices and processes. It is important to note how the particular Values Added are conceptually generalizable, having the ability to describe seemingly disparate phenomena. Consider Access III (Subject Summary) as a case in point, with its purpose "to provide a summary and/or brief explanation of the content of an item" (Taylor 1986, 60). LIS and KO scholars can immediately recognize the direct parallels between the Access III value and the abstracting portion of the A&I operation, and indeed, given the genesis of the Value-Added Model, this would seem a valid connection to make. Yet the Access III value does not end at abstracting, but rather can be seen in a range of contexts outside A&I (Taylor 1986, 60):

The function of such processes is to benefit users by reducing a large amount of information into a compact item without losing too much information in the process .... They may take the form of an abstract, executive summary, a news brief, or a table of contents... a chemical structure diagram; a map; a graph or chart; a mathematical formula.

So the essence of the Access III value is really about the generalizable phenomenon of compression: chunking information so users can "be informed in

less time and with less effort" (Taylor 1986, 60). It is in this generalizability, coupled with its grounding in A&I operations, that Taylor's model shows potential as an evaluation tool for KO processes.

The Value-Added Model is steeped in Taylor's study of the quintessential KO practice of indexing and abstracting. His analysis of the work of information professionals was further grounded in an unwavering user-based perspective. Perhaps most importantly, Taylor's Value-Added Model offers a vocabulary for talking about and evaluating information processes in such a way that parallels can be drawn across seemingly disparate information processes. In this regard, Taylor's vocabulary has the potential to augment or otherwise enrich emerging frameworks for evaluating KO systems (e.g. Tennis 2006).

The richness of the Value-Added Model is in its ability to describe a vast range of information processes. This can be considered a particular strength in a time when increasing specialization (in the information field and beyond) threatens to create major gaps in scholarly communication. Instead of slouching towards academic Babel, information researchers could commit to speaking a common language of evaluation; that language could specifically be articulated to keep user needs and preferences as the central focus of our discussion. KO researchers have an opportunity to lead such a charge. The Value-Added Model offers us a vocabulary grounded in the analysis and evaluation of KO practice; it is explicitly designed to assess value in a way that transcends the particularities of any one technology platform or use environment.

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