INTERPRETIVE METHODOLOGY FOR ORGANIZING RESOURCES IN INFORMATION SYSTEMS

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PROBLEM: The widespread use of computing and global electronic networks have generated a phenomenal increase in the number of resources (i.e., data/information, links/referrals, computing functions) available to individuals. Keyword-based full text searches (e.g., Google) generally produce either nothing (in which case we usually assume that we did something wrong) or else an immense number of listings that we must sift through and, employing trial-and-error, *maybe* find what we need. Otherwise we attempt to access resources through some kind of information system (e.g., listing, index, interface). The current state-of-the-art logic for organizing these resources relies on a single expert-based, descriptive, nominal dimension, i.e., categories that reflect what the things are that are being organized. The Library of Congress Subject Classification System or the "File," "Edit," etc. menu bars in software applications are classic examples. Understanding what one category or heading or menu selection holds does not help us understand any other one. If we randomly access a nominal dimension (represented by a black dot in Figure 1) the user has no way to navigate to find what s/he needs (represented by the "X" in Figure 1) other than by trial and error or memorization of the dimension.

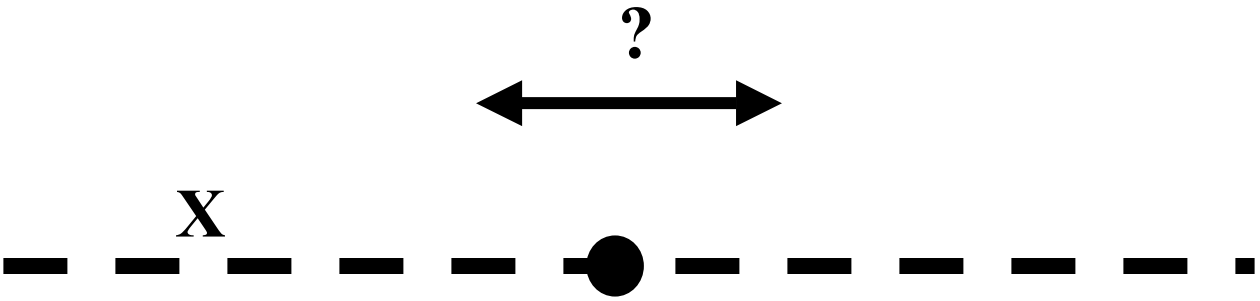

Figure 1. User navigation with nominal resource organization.

All existing resource organization systems employ such nominal dimensions. One way to describe a system (in a more general sense) is as a series of steps that constrain a user's step taking along a certain path that is intended to solve a human problem ("problem" here is used in a general sense, see Figure 2). We assume that this path is based upon a clear understanding of the human problem, the optimum type and sequence of steps necessary to reach the goal, and usability requirements, especially for novices. These conditions are virtually never met and the selection and sequencing of steps is done based upon an expert's view of how the problem

"ought" to be solved. Hence reading a manual is a necessary step to make most systems usable. In a resource context, memorizing the dimension is the only way to effectively employ the organization system/dimension. Trail and error is usually too "expensive" to even consider.

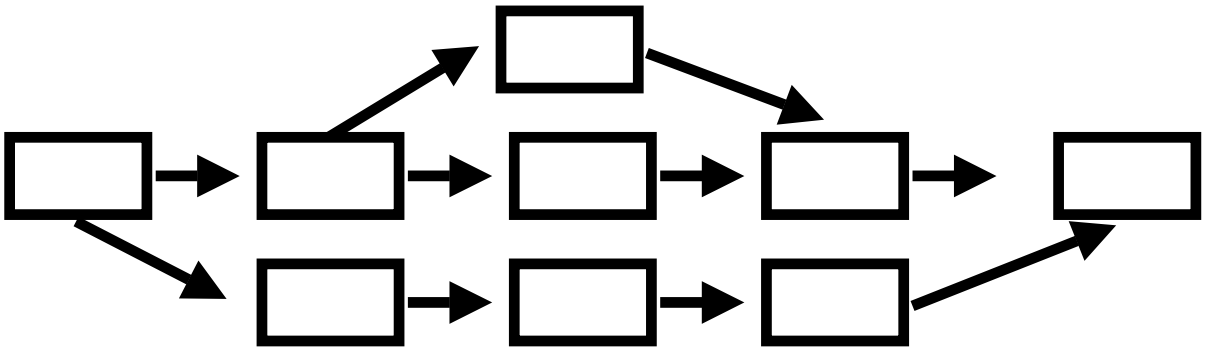

Figure 2. Representation of "system" as a logic constraining step taking to solve a human problem.

A system is often not merely a set of linked steps but also employs some constraints as "technology." However, the technology only addresses part of the effective step taking. Consider a hammer and a nail. Effective use of this technology also requires understanding the use of the technology and the materials being fastened or fixed. When we look at systems that rely on computing and global electronic networks, knowledge of computing or even network mechanics does little to facilitate human resource access without understanding the resource organization logic/dimension. Add the increasing volume of resources and we have an intractable situation given existing solutions.

Resource systems fail for one of two reasons: One, what the user needs is not there or two, because it is too difficult for the user to find what s/he needs. In the case of the first reason, resource collections are becoming so large that we can no longer effectively determine whether or not the resource is there (e.g., a Google search that returns nothing—is it really not there or did we "screw up?"). In the case of the second reason, employing logic or dimensionality to structure the system that either doesn't match the user's actual problem or the logic/ dimensionality itself is not intuitive or there are too many resource units at a given step for the user to realistically sort through results in user frustration. Employing single dimensions that are expert-based and nominal for large collections of resources virtually guarantees failure.

We know that from a technology perspective, the technology *per se* is insufficient to insure effective human problem solving. Users need a coherent understanding of the role of the technology in the larger context of the human problem. From a content perspective we know that resources do not "mean" the same thing to all users or even the same thing to the same user at different times. In communicating, the "meaning" is not in the word/content but rather lies in the individuals collaborating to make sense—the content is merely an *a posteriori* artifact of the communicative collaborating. From a behavior perspective, we know that there are almost always multiple ways of solving a problem, some potentially better than others based upon criteria salient to the user. We also know that resources useful at one step are different than the

resources that are useful at another step. Further, we know that users won't read the manual. Linguistically, we know that a meaningful utterance (spoken, written, visual, aural, etc.) is composed of two necessary components: "topic" or *what* the speaker is talking about and "comment" that *situates* the topic from the speaker's perspective (Yoon & Nilan 1999). All current expert-based, nominal dimensions are based upon the "topic" or what the resource is (e.g., subject, author, publication info, keywords, etc.) (Yoon & Nilan 1999). Note that full text strategies are similarly limited by "keywords." What is missing is the "comment."

In order to address the issue of access to resources in the current resource-rich environment engendered by our global electronic network environment, we need:

- Organization dimensions that are inherently meaningful to and therefore navigable by users (i.e., no manual or memorization as a prerequisite and that express both topic and comment components of meaning); and
- Multiple dimensions to help express (minimally) the orthogonality of the topic and comment components of meaning. As will be suggested below, multiple dimensions will also facilitate accommodating the ever-increasing volume of resources.

SUGGESTED SOLUTION: Resource organization is essentially creating "piles" of resources in a manner that has an inherent, meaningful (and therefore navigable) "order" to them (e.g., ordinal- or interval-level measurement). Multiple dimensions enable more complex logic (e.g., topic *plus* comment in separate dimensions) to be used for both placement of and access to the resource piles. If the user can easily figure out the logic underlying the piles, the user will be able to navigate through the available resources (Nilan 1992). To illustrate on a single dimension, if we randomly access an ordinal dimension (represented by a black dot in Figure 3) the user only has to understand the logic of the ordinal dimension to navigate to find what s/he needs (represented by the "X" in Figure 3).

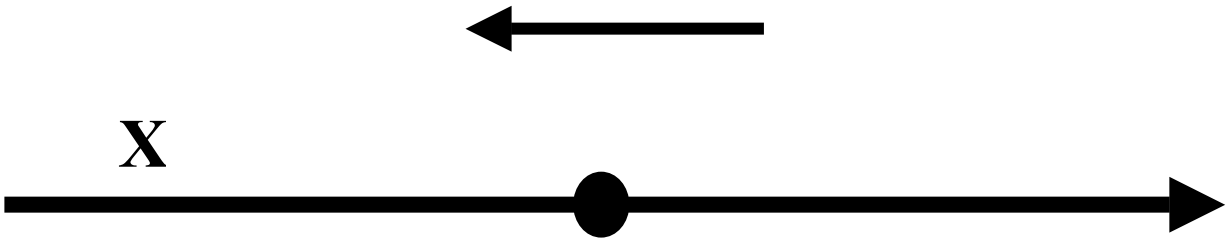

Figure 3. User navigation with ordinal resource organization.

Robert Fulghum (1993) described basic orientations to problem solving in life as things he learned in kindergarten (e.g., sharing toys, waiting in line, etc.). Research employing Dervin's Timeline Methodology (Dervin 1983) has repeatedly demonstrated that people have similar ways of thinking about and talking about the situations in which they find themselves in terms of the similarity of steps that they take as well as the order in which they take steps. The similarity of steps and the agreed upon time order of those steps suggests a way of creating ordinal dimensions that people already know, at least at an abstract awareness level.

This kind of strategy was employed to develop an interface for a desktop publishing software application package (Nilan 1992). Figure 4 shows a conceptual schematic of an analysis process for multiple Sense-Making Timeline step sequences from people who are solving similar problems or, in Dervin's terms, who are describing their movement through similar situations. The process is to lay out the timeline steps so that each respondent's steps are in a single row. Without breaking the respondents' time order, steps are shifted left or right to align similar steps vertically. The resultant time sequenced set of columns (in Figure 4, the steps which are linked by a solid line) where the majority of respondents articulate a similar step represent a generalized or abstract, linguistic description of movement that makes sense (pun intended) to users who are in a similar situation or solving a similar problem. These representations can be seen as "topics."

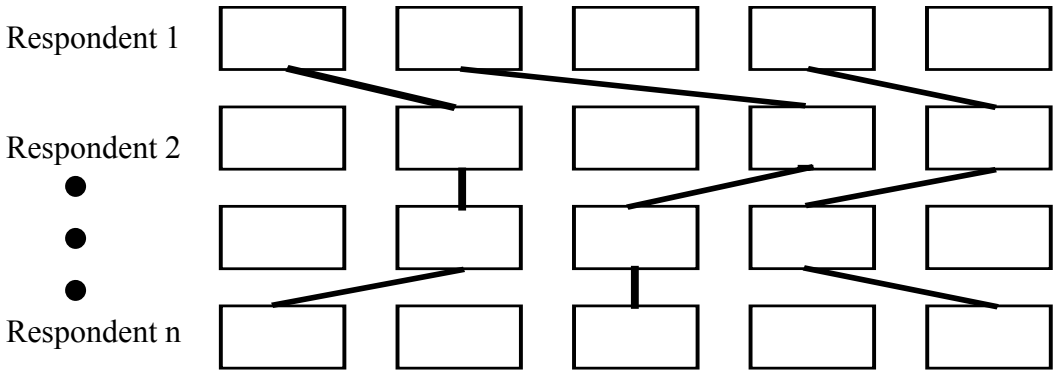

Figure 4. Schematic of the analysis of timelines to generate an abstract description or "model" of human movement through a situation/problem solving process.

In the desktop publishing example, the columns where respondents agreed upon a step AND the steps across respondents were in the same time order became the menu bar across the top of the screen. In essence, the steps in between the agreed-upon generalized steps represented the difference between experts in desktop publishing, who have more complex views of the movement by definition, and novices who have less complex views. These steps populated the first drop-down menu (see Figure 5).

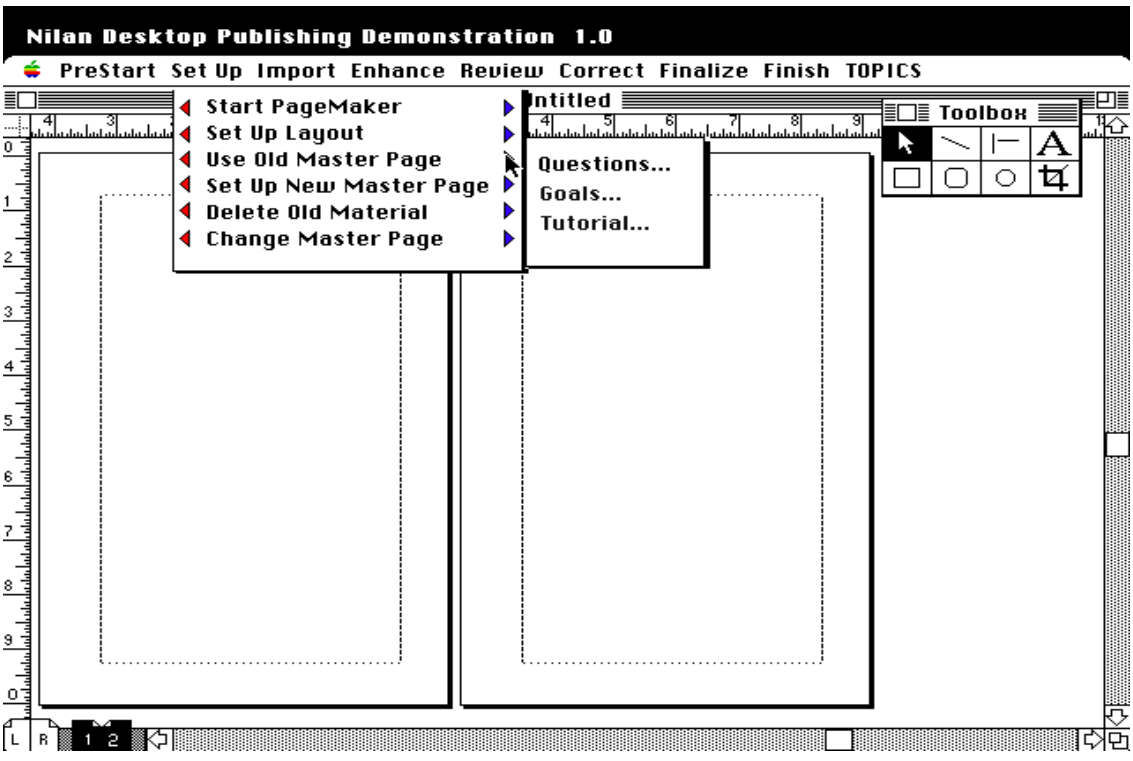

Figure 5. Desktop publishing example of an ordinal resource organization dimension.

Since Timelines can also tap into the resource needs (e.g., information seeking plus information use plus source), associated with each step in the model, we also have the list of resources aggregated across all respondents. These essentially "situate" the resource and can be seen as "comments." In Figure 5, the resources (the second drop-down menu) are further divided by an ordinal dimension that represents the "size" of the resource—small, question & answer units; larger, strategy-oriented goal recipes;" and very detailed step-by-step tutorials. As long as the sample is large enough and diverse enough to capture a full range of human orientations to the problem, we have a reasonably robust catalog of available resources to "link" to the model (this is demonstrable through redundancy/saturation of resource elements). In essence, what we have accomplished is to pile all the resources mentioned by our sample according to the steps where the resources were judged useful and created an ordinal, time-sequential "meta-" representation of the problem for users to navigate through the piles. Some resources are linked to more than one step, a condition absolutely "forbidden" in nominal schemes but perfectly logical in practice. Since the menu bar is laid out in time order and employs language from users themselves, users—even new ones—can easily figure out "where" they are in their own desktop publishing step taking and they access the resources based upon the specific step/action that they are attempting.

This example serves to illustrate the application of Dervin's Sense-Making for the generation of an ordinal dimension for a software application which represents a more limited resource collection. This same approach could be applied to the design and implementation of an organizational intranet if the organization is viewed as a collection of problems that members collaborate on (Weick 1995). In this case, the range of problems representing the organization would constitute a small nominal dimension that the user would begin with and the individual problems addressed as described above would represent a series of ordinal dimensions. The user, even a new employee, would select a problem, a meta-step and then a step to get to a short list of resources that others who have solved that problem have found useful. Large heterogeneous collections of resources could be aggregated "above" the organizational level. A "fractal" metaphor comes to mind—a distributed network of coherent Sense-Making timeline problem dimensions aggregated within problem, then within organization or community, then society? Culture? Although there isn't room here, such a strategy could easily be implemented to accommodate changes in steps, problems and resources over time, by users and experts alike. This de-centralized view, however, is one that content folks will likely resist since it implies a "dilution" of expert control of access.

References

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