A Model Of Knowledge Based on Multi-Dimensional Ontology

A multi-disciplinary approach to the nature and characteristics of knowledge

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Research Method

- A synthesis of knowledge theory
  - requires interpretation
- Data sources
  - literature (many disciplines)
  - discussion groups at Monash University
  - experience with system development projects

Assumptions

- Problems defining K
  - Describe nature & characteristics instead
- If you think you know something, you do
  - K includes assumptions, perceptions, beliefs
- The model is based on an individual perspective
  - Individual perspectives may be combined to produce a group perspective
- The model includes internal knowledge and its external representations

Model Components

<table>
<thead>
<tr>
<th>Content</th>
<th>Metaknowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Dimensional</td>
</tr>
<tr>
<td>Link</td>
<td>Abstraction</td>
</tr>
<tr>
<td>Association</td>
<td>Entropy (Uncertainty)</td>
</tr>
<tr>
<td>Pointer</td>
<td>Access</td>
</tr>
<tr>
<td>Channel</td>
<td>Availability</td>
</tr>
<tr>
<td>Composite Items</td>
<td>Applicability</td>
</tr>
<tr>
<td></td>
<td>Value</td>
</tr>
<tr>
<td></td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td>Non-Dimensional</td>
</tr>
</tbody>
</table>

Dimensions

- Aim
  - quantify basic characteristics of K & represent them on a model
- Premise
  - any K represented in each dimension
  - independent dimensions (as much as possible)
  - graded scale from one extreme to another
  - meaningful relationship between dimensions

Access Dimension

- How an individual accesses his/her own K
- Unconscious = Tacit

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Availability Dimension

- Degree to which K is made available

Access & Availability

- External (~Explicit)
- Internal (~Implicit)

Public
- Private

Diffuse
- Local
- Comprehensive
- Partial
- None

Modes and Conversions

The main properties of Modes are:
- Content and context
- Subtasks of the main task for that Perspective
  - this implies purpose and motivation
- Inputs and outputs
  - this may include interactions with other Modes and perspectives as well as feedback

A Conversion transforms K in 2 ways:
- conversions within a mode - e.g., grouping ideas
- conversions between modes - e.g., speech

A Communication Model

## Evaluating Models I

The Learning Cycle

- Learning cycle includes Abstraction, Uncertainty (clustering, structuring, fabrication), and Time.
- Access, Availability, Applicability and Value are not explicitly represented.

![Learning Cycle Diagram](image)


## Evaluating Models II

- Many models in the literature can be evaluated in terms of the K model presented here:
  - Learning cycle
  - Communication models
  - SDLC
  - Gantt charts and Pert charts
  - ER diagrams and DFD’s
  - Burrell and Morgan’s Four Paradigm Model
  - and many others

## So What?

- A summary of K theory
- Surfaces assumptions, identifies ‘paradigms’, and generates discussion
- Helps eliminate duplication in existing theories
- Helps future researchers with both a context and a focus for their research
- Useful as a classification system

## Conclusion

- A knowledge research epistemology
  - identify the fundamental K characteristics of the problem
    - locate them on the model
  - build models in terms of fundamentals
  - identify the characteristics that were ignored and why
    - locate them on the model, that is, specify context

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