Values:
The Ultimate Semantic Technology

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Introduction and Objectives

OMT Origins

- The Ontology Management Team (OMT) was established as outgrowth of the Ontolog Forum.

- Ontolog is a virtual community of practice focused on the use of ontologies in business.

- See http://ontolog.cim3.net/cgi-bin/wiki.pl/.

OMT Mission and Focus

- Develop reliable methods for driving ontological alignment within working groups.

- Clearly differentiate Ontology Management and Engineering activities.

- Produce improved methodologies for ontology development.

- Leverage new methodologies to deal with more general issues of policy development within large enterprises.

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OMT Policy Vector #1

■ **Issue: Implicit policymaking by technologists.**

– Management's abdication of policymaking responsibilities.

– Occurs when the policy implications of design decisions are poorly understood.

– Risk increases when dealing with emerging technologies.

■ **Strategy: Make policy decisions transparent.**

– Identify critical decisions that have significant downstream policy impacts.

– Develop analytical and governmental processes to enable understanding and resolution of associated policy issues by the appropriate stakeholders.
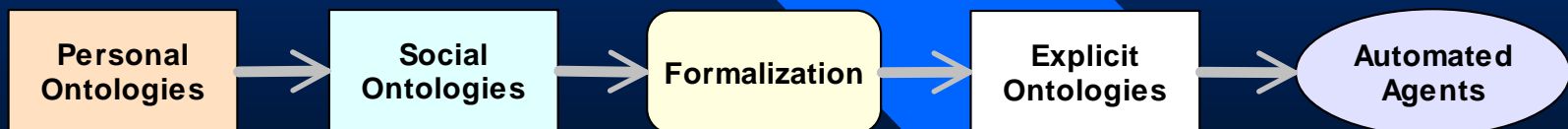
OMT Policy Vector #2

- **Issue:** Disruptive impact of incomplete consensus and Dynamic Semantics on ontology engineering efforts.

- **Strategy:** Expand ontology development methodologies to deal effectively with Dynamic Semantics.
  - Understand the role of natural ontologies in sensemaking.
  - Develop methods to assess semantic distance, volatility, and drift.
  - Develop procedures for negotiating and "narrowing-the-gap" when semantic conflicts are encountered.
  - Develop a "language" for defining semantic policy that is usable by both policy makers and ontological engineers.

OMT Policy Vector #3

- Issue: Other areas of organizational behavior are increasingly experiencing the alignment issues typically associated with ontological engineering initiatives.

- Strategy: Generalize ontology management practices to:
  - Deal with broader issues of organizational meaning.
  - Resolve semantic issues in other policymaking domains.
  - Balance and prioritize semantic alignment efforts across initiatives.
  - Establish benchmarks for semantic accountability.

SemTech 2005 Reprise

- Semantics are naturally and inherently dynamic.

- Initial uncertainties and inevitable semantic changes undermine the alignment of formalization efforts.

- MetaKnowledge-based analysis and formalization
  - Is more resilient and less brittle than other approaches.
  - Allows semantic changes to be more easily anticipated and reacted to.
  - Requires less remedialization and fewer false starts.
  - Enables semantic change to be used as an asset for enhancing delivered value.

Personal Ontologies → Social Ontologies → Formalization → Explicit Ontologies → Automated Agents

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SemTech 2006 Objectives

- Improve ability to anticipate and adapt to the semantic instability inherent in organizational systems.

- Better understand and leverage the mechanisms underlying the phenomenon of Dynamic Semantics.

- Relate human values to sensemaking and the association of meaning to knowledge artifacts.

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Values as a "Technology"

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Decisionmaking is Expensive

- Relies on a series of complex and sophisticated activities:
  - Data collection and interpretation.
  - Organization and pattern recognition.
  - Identification of motivations, causalities, and implications.
  - Synthesize actionable knowledge.

- Evolutionary advantages to be gained by reducing cost (time and effort) of decisionmaking.
  - e.g., OODA Loops.

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Values Cut Decisionmaking Costs...

- **Usually abstracted (decontextualized) in order to be applied across a variety of behavioral contexts.**

- **Often comprise significant implicit and tacit knowledge components.**
  - Including "truly" tacit knowledge that defies articulation.

- **Represents a form of bounded rationality.**
  - Doesn't just impact the amount of knowledge used in decisionmaking (sufficiency).
  - Impacts pattern recognition and other transformative behaviors.

- **Enables much of the decisionmaking process to remain implicit and tacit, operating at a subconscious level.**

...But at the Risk of Poor Decisions

- Values can drive sub-optimal decisions.
  - Limit perception of contrary and mitigating evidence.
  - Reinforce understood and accepted interpretations.
  - Constrain associated semantics to those consistent with established behavioral patterns.

- Risk increases with changes across or within specific behavioral contexts.

- Risk increases when the impact of values on decisionmaking goes unrecognized.

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Potential Organizational Issues

■ When unaccounted for, implicit and tacit values in systems can drive:

- Semantic breakdowns.

- Polarization and conflict.

- Group think.
    - » Perpetuation of hidden biases.
    - » Missed opportunities.
    - » Inability to perceive risks.

"Competing" Value Systems

- Semantic Interoperability
- Service-Oriented Architecture
- Communities of Practice
- Systems Services Dynamics
- Outsourcing
- Workflow Management
- Organizational Governance
- Knowledge Flow Alignment
- Semantic Warfare
- Ontological Engineering
- Policy Engines

- Content Management
- Intellectual Property Management
- Performance Management
- Grid Computing
- Knowledge Management
- Data Mining
- Artificial Intelligence
- Business Process Management Systems
- Supply Chain
- Cyber Warfare
- Etc.

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Unwritten Rules*: Hidden Values

- Showcase the boss.
- The boss can do whatever he or she wants.
- Doctors are king.
- Call women doctors by their first names.
- Don't sit in the doctor's chair.
- Doctor's can't use nurses' station.
- White males are in charge.
- Managers don't take two weeks of vacation time in a row.
- Managers play favorites.
- Managers don't wear striped ties.
- Nurses should be willing to do anything.
- The best nurses do things no one else will.

- Nurses should not take responsibility for peers; they should grumble, instead.
- Never take pens out of the nursing office.
- If there is a mistake, blame it on the student.
- If there is a mistake, blame it on the new nurse.
- Nurses with false fingernails can't do patient care.
- Don't sit in the clerk's chair.
- Ok to dump on agency nurses.
- Don't dump on agency nurses.

* 2003, Briles, Zapping Conflict in the Health Care Workplace.

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Case Studies

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Failure: Fit®

- Organic solvent to remove:
  - Waxes, fungicides, pesticides, pathogens.
- Consumer values:
  - Eat more fresh fruit and vegetables.
  - Cleanliness.
  - Purity.
- Developer didn't understand market. Missed opportunity.
- Marketer didn't sufficiently educate market.
  - Consumers assume shiny = clean.
  - Dull = clean.
  - Commercials showed dirt, didn't emphasize hidden compounds.

®Procter & Gamble

Failure: A Controversial Initiative

- **Tension between centralized and decentralized authority.**
  - History of efforts to undermine centralized authority.

- **Stakeholders engaged in project initiation.**

- **Resulting project plan didn't reflect communities priorities.**
  - Some, draft WBSs did reflect community's strategies and priorities.

- **Centralized team experienced ~80% turnover within 2 years.**

- **Initiative decentralized.**

Success: Apple® iPod®

- **Consumer values:**
  - Carry lots of music.
  - Low incremental cost.
  - Ease of use.
  - Control / ownership.
  - Style.
- **Producer values:**
  - Royalties (copy protection, iTunes® Music Store).
  - Easy, low cost distribution methods and infrastructure.
  - Commercial and non-commercial producers.
- **Understand and design to total lifecycle experience.**
  - Multiple value systems.
  - Different optimization points.

® Apple Computer, Inc.
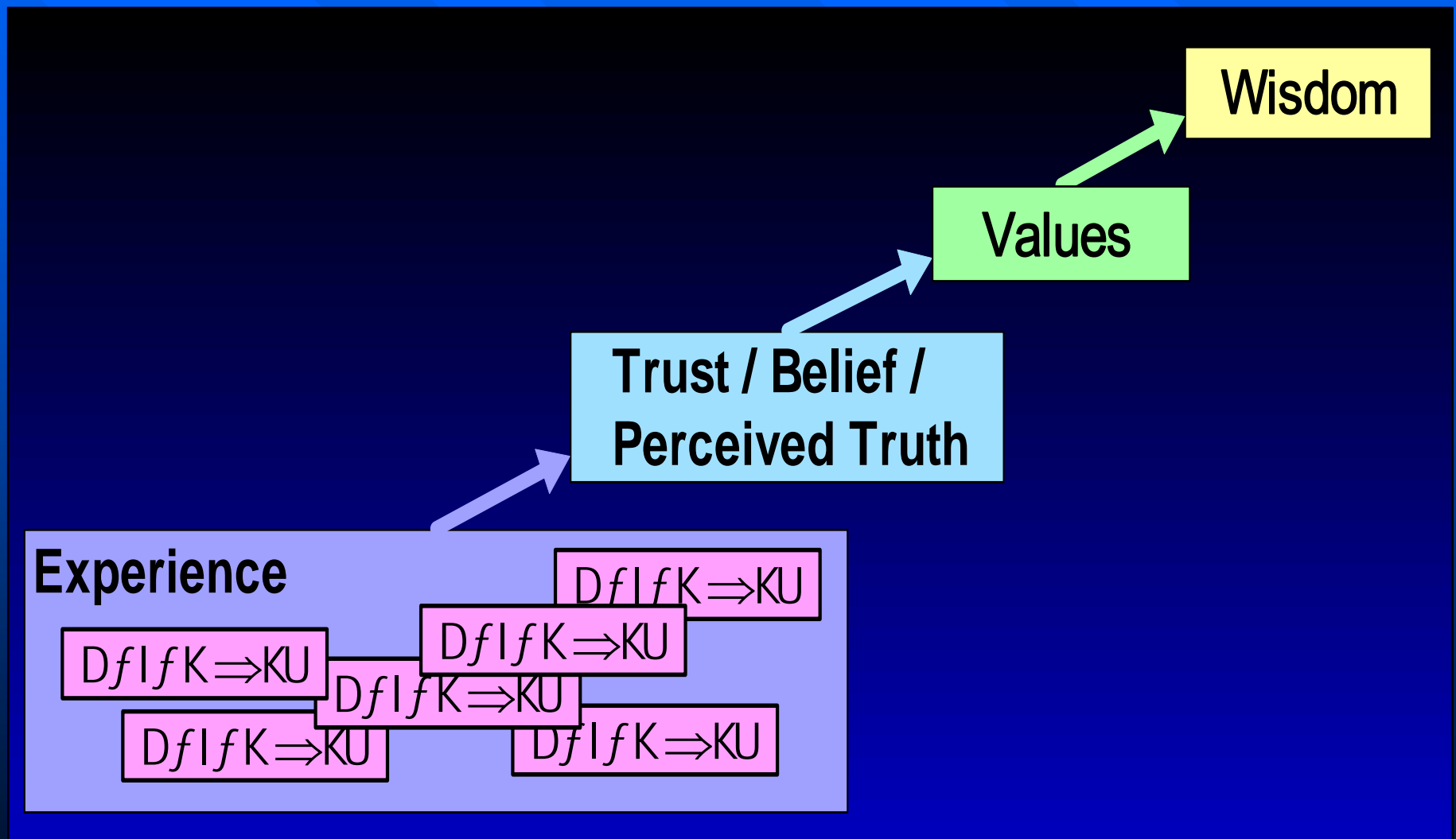
Values as a "Semantic Technology"

Knowledge Vector Model

$$D \; f \; I \; f \; K \Rightarrow KU$$

- Describes a continuum of Knowledge Artifacts (KA), intermediate transformations (f), and resulting behaviors.
  - Boundaries between Data (D), Information (I), and Knowledge (K) are not discrete, but are used for modeling purposes.
  - K represents the point of actionable synthesis of all event-specific (K_E) and prior (K_P) knowledge.
  - A Knowledge Utilization Event (KU) is an action or decision enabled by K.

- Provides basis for understanding the origin of values and the impact of values on semantic association.

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Knowledge Vector Principles

- Agents use knowledge to execute behaviors.
  - Automated agents require all elements of the Knowledge Vector Model (KA, f, & KU) to be explicit.
  - Individuals and organizations can leverage implicit and tacit knowledge elements to "skip steps".

- People have a strong incentive to skip steps to make things easier.

- The scientific method does not come naturally.

Impact of Knowledge on Values

Wisdom

Values

Trust / Belief / Perceived Truth

Experience

$D f I f K \Rightarrow KU$

$D f I f K \Rightarrow KU$

$D f I f K \Rightarrow KU$

$D f I f K \Rightarrow KU$

$D f I f K \Rightarrow KU$

$D f I f K \Rightarrow KU$

Values

- Values (including Principles, Interests, and Expectations) are KAs that represent networks of prior knowledge.

- Most importantly, values are routinely disassociated with major portions of the originating knowledge network.

- Disassociation is a form of knowledge compression.
  - Reduces processing time, communications time, recall time.
  - Allows values to be used as abstract KAs that can be applied in a variety of behavioral contexts.

- Wisdom relates to judgment and the ability to work intelligently with multiple sets of values.
  - Conflict avoidance, conflict resolution.
  - Balance short-term and long-term perspectives.
  - Avoid unary values-based, sub-optimal decisionmaking.

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Semantic Segmentation Model

$$D \ f \ I \ f \ K \Rightarrow KU$$

Interpretive   Behavioral

Contextual   Aspirational

- **Sensemaking is a multi-step process.**

- **Knowledge Vector elements are associated with a distinct classes of semantic properties.**
  - Interpretive semantics.
  - Contextual semantics.
  - Aspirational semantics.
  - Behavioral semantics.

- **Values directly impact the association of increasingly sophisticated meanings throughout the Knowledge Vector.**

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Values Impact Semantic Associations

- **Perception.**
  - What KA are considered irrelevant, noisy?
  - What KA are considered important, valuable, potentially useful?

- **Interpretation.**
  - What concepts are associated with inputs / symbols?
  - What referents are associated with the concepts?
  - How is ambiguity to be resolved?

Values Impact Semantic Associations

- **Contextualization.**
  - Which context / sensemaking structure is most appropriate?
  - How does this KA fit? How should it be positioned?
  - What rules should be used to organize and relate KAs?
  - What patterns emerge? Are they useful or distractions?
  - What can be inferred? What implicit K is relevant / important?
  - Are the sources credible? Has this K proved its value in the past?
  - Is the K applicable at this time, in this situation?
  - Is this consistent with history and trends?

Values Impact Semantic Associations

- **Aspirations.**
  - How do the KAs relate to goals and objectives?
  - What are the motivations, intentions, and strategies of the relevant agents?
  - Do the agents support my interests or are they in conflict?
  - How does potential conflict influence K acquired from those sources?
  - Is the K actionable, or do critical K gaps exist?

- **Behaviors.**
  - What casual models apply?
  - What behaviors / results can be expected?
  - What are the risks and probabilities?
  - What alternatives and contingencies exist?

Ambiguous Semantics of Values

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Methods for Leveraging Values in Semantic Technology Initiatives

AtStake

- Developed by Joe Beck to address conflicts associated with environmental and health management.

- Stakeholder-focused strategic planning process.

- Makes operative values of participants explicit.
  - Values terminology provides a safe vocabulary for defining the community's vision of success.
  - Supporting discussions transfer implicit and tacit semantics associated with the explicit values.

- Typically results in strong consensus among participants.
  - Explicit, mutually-beneficial performance targets.
  - Energizes continued participation.
  - Alignment of decentralized decisionmaking.

- Emphasizes conflict avoidance.

- Provides a model for developing customized values-based analysis and decisionmaking processes.

Conflict Resolution

- Developed by Stewart Levine to formalize intuitive processes used to resolve complex legal, organizational, and personal disagreements.
- Iterative process.
    - Reduces emotional energy.
    - Identifies conflict drivers and associated aspirational semantics.
    - Restores/establishes empathy and shared values.
    - Progresses through a sequence of general to specific agreements.
    - Addresses each semantic segment.
- Designed to produce explicit, well-structured agreements.
    - Intent, vision, roles, and promises.
    - Time, value, and measurements of satisfaction.
    - Concerns and fears.
    - Negotiation and dissolution.
    - Consequences and conflict resolution.

Semantic Consensus Teams

- Methodology developed to address a range of issues and initiatives.
  - Metadata framework to improve semantic interoperability.
  - Web search, retrieval, and navigation.

- Cross-cultural teams (marketing, engineering, technical documentation).
  - Given a Semantic Workpackage, comprising a set of related terms.
  - Engage in research to:
    » Identify other terms that should be included in the Workpackage.
    » Accepted definitions and alternate forms of the terms.
  - Identify and differentiate individual concepts and key relationships (including organizational scope).
  - Normalize semantics by developing or selecting candidate definitions.
  - Normalize terminology by selecting candidate normative terms, listing alternatives, and identifying any semantic variations and issues.
  - Document the level of consensus and any outstanding knowledge gaps.

On the Horizon

- Values-based ontology development process.

- Introduction of values-based logic to complement existing axiomatic models of semantic formalization.

- Extend values-based conceptual alignment methods to address a broad range of policy development and governance issues.

Conclusions

- Values, not facts, drive decisions.

- Values-based analysis methods:
  - Facilitate better ontological alignment across individuals and organizations.
  - Improve the quality of policymaking.
  - Stabilize organizational context, requirements, and specifications for engineering efforts.
  - Improve the quality of semantic formalization and articulation.

Questions?

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