

Characterizing Knowledge Management Tools

Half-day Tutorial

Presented by Kurt W. Conrad
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Developed by Kurt W. Conrad, Brian (Bo) Newman, and Dr. Art Murray

Based on *A Framework for Characterizing Knowledge Management Methods, Practices and Technologies*, Newman and Conrad, 1999

From **The Knowledge Management Theory Papers**
A series of papers on the theories, processes and practices behind Knowledge Management

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Introductions

- Name
- Organization
- Why are you attending this tutorial?
- What are you hoping to get out of it?
- Specific areas of interest

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Introducing Kurt Conrad

- Director of Knowledge Management for Tomorrow Farm
- Specializes in
 - Enterprise document management
 - Strategic planning and mediation
 - Process and methodology development
 - SGML, XML, and related standards
- kurt@tomorrowfarm.com, kurt.conrad@km-forum.org,
conrad@sagebrushgroup.com

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Introducing Bo Newman

- Founder of the KM Forum
- Recognized as one of top 10 KM practitioners
- Active in development of supporting theories and practices for over 15 years
- bo.newman@km-forum.org

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Introducing Dr. Art Murray

- President of Telart Technologies, Inc.
- 24 years experience leading advanced information and knowledge systems initiatives
- Adjunct professor in the School of Engineering and Applied Science at The George Washington University
- Collaborates with American and Russian scientists to integrate western and eastern approaches to KM

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Introducing KM Forum

The original, virtual community of practice that focused on discussing and exploring the foundations of what has now become Knowledge Management

www.km-forum.org

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Introducing Tomorrow Farm

Strategically integrates creativity and technology to produce effective digital media

- Highly-dynamic, database-driven web sites for cutting-edge dot-coms
- Film and video production for advertising, marketing, and corporate communications
- CD-ROM and DVD production for marketing, instruction, and entertainment

www.tomorrowfarm.com

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Why Characterize Tools?

- Any tool can enhance knowledge
 - Improve knowledge flow
 - “Intelligize” behaviors
 - Increase organizational value
- Individual tools are not same as a comprehensive KM solution
- Tools can't manage knowledge

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Why Characterize Tools? The Chaos that is KM

- KM technology market undermines understanding
 - Everything is labeled “KM”
 - No clear distinctions or differentiation
 - Not clear how things fit together
 - Difficult to integrate methods, practices, and technologies
- Characterization is one answer to the chaos

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Tutorial Overview

- Combination of lecture and small group exercises
- Goals
 - Introduce the KM Tool Characterization Framework
 - Use KMTCF to assess potential impacts of tools on Knowledge Flows
 - Review other potential applications of the Characterization Framework

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Tutorial Overview Agenda

Module 1: Key Terms and Concepts

Module 2: Framework Overview

Module 3: Practice Session

- Selection of Topics
- Small Group Analysis
- Reporting of Findings

Module 4: Advanced Usage

Wrap-Up

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Module 1: Key Terms and Concepts

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Key Terms and Concepts
Origins of Concepts

- Outgrowth of Newman's study of knowledge lifecycles and development of his General Knowledge Model
- Refined through Conrad's application to strategic IT and organizational development initiatives
- First formalized to support Murray's *Introduction to Knowledge Management* course, currently being taught at George Washington University

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Key Terms and Concepts
Knowledge Flows

Knowledge flows comprise the set of processes, events, and activities through which data, information, knowledge, and meta-knowledge are transformed from one state to another resulting in, but not limited to, knowledge creation and capture, retention, transfer, and use.

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Key Terms and Concepts
Knowledge Flow Elements

- Agents
- Knowledge Artifacts
- Activities (agent behaviors organized by activity area)

Note: No matter where you start introducing these concepts, you have to start somewhere else

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Key Terms and Concepts
Agents

- Agents perform all actions and make all decisions within a knowledge flow
- Agents come in various types
 - Individuals: Who don't perform a given task the exact same way every time
 - Automated agents: Which can't deal with tacit knowledge
 - Organizations: Who can neither read nor write
- The same behavioral models do not apply to all types of agents

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Key Terms and Concepts - Agents Individuals as Agents

- Key behavioral traits
 - Inconsistency, creativity, adaptability, etc.
- Strengths
 - Able to deal with wide ranges of abstraction, codification, and representation
 - Original "multi-media" agent
- Weaknesses
 - Imperfect memory: forget and change
 - Unstable ontologies (world views)
 - Not good at repetitive behavior

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Key Terms and Concepts - Agents Automated Agents

- Key behavioral traits
 - Excel at dealing with explicit artifacts
 - Highly-engineered
- Strengths
 - Exacting repetitiveness, high speed
 - High-volume, stable memory
- Weaknesses
 - Lack of foresight
 - Inability to handle tacit artifacts
 - Weak adaptation behaviors

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Key Terms and Concepts - Agents Organizational Agents

- Key behavioral traits
 - Slow to change
 - Long-lived
 - Unable to make decisions and take action
- Strengths
 - Leverage multiple skills and talents
 - Cultural stability
 - Predictable behavior
- Weaknesses
 - Resistance to change and new paradigms

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Key Terms and Concepts Knowledge Artifacts

Knowledge artifacts flow among and form the linkages between the activities and events that comprise knowledge flows.

As processes speed up, artifact life spans get shorter

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Key Terms and Concepts - Artifacts
Artifact Characteristics

- Artifacts differ in codification, rendering, abstraction, and articulation
- Current differentiations
 - Explicit artifacts
 - Implicit artifacts
 - Tacit artifacts
- Artifacts are passive
Have you ever seen a financial report make a decision, or a book on aerodynamics build an airplane?

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Key Terms and Concepts - Artifacts
Explicit Artifacts

- Can be directly and completely transferred from one agent to another
- Normally codified so that we can touch, see, hear, feel, and or manipulate them
 - Books
 - Reports
 - Data files
 - Other forms that have a physical manifestation

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Key Terms and Concepts - Artifacts
Implicit Artifacts

- Meaning is not explicitly captured, but can be inferred
 - Incomplete codification
 - Need for additional context
- Most difficult concept of the three
 - Gray zone
 - Often confused with tacit
- Represent vast bulk of human communications

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Key Terms and Concepts - Artifacts
Tacit Artifacts

- What you cannot talk about
 - Knowing more than you can say
 - Defy expression and codification
 - Have very far reaching influences
 - May be the most insidious and powerful of the three
- Bound up in culture, values, and feelings

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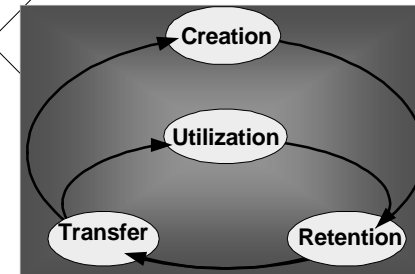
Key Terms and Concepts Activities

- Agent behavior comprises the action and decision making elements of knowledge flows
- Segmenting behaviors into activity areas simplifies analysis
- Each activity area is associated with different processes, tasks, and design implications

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Terms and Concepts – Activities Activity Areas

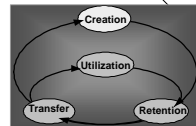


Source: *General Knowledge Model*, Newman and Conrad, 1999

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Terms and Concepts – Activities Knowledge Creation



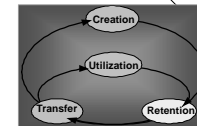
Any activity that brings new knowledge into the system

- Development
- Discovery
- Capture
- Acquisition
- Etc.

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Terms and Concepts – Activities Knowledge Retention

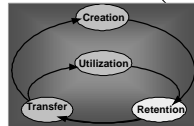


- For knowledge to be usable it must be stored for some period of time
- Knowledge retention
 - Preserves knowledge artifacts
 - Maintains the viability of knowledge within the system
 - Is imperfect

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Terms and Concepts – Activities Retention Activities

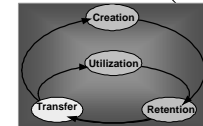


- People create stories, build machines, develop models, code software
- Organizations re-enforce and preserve culture
 - Work procedures
 - Unwritten rules
 - Mores and values
- Computers store data

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Terms and Concepts – Activities Knowledge Transfer

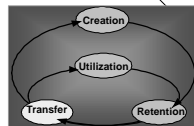


- Knowledge transfer moves knowledge from one agent to another
- From knowledge developers to knowledge users
 - From one work group to another
 - From suppliers to vendors and vendors to customers

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Terms and Concepts – Activities Transfer Activities

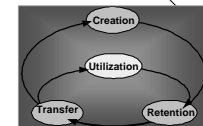


- People tell stories
- Mentors teach
- Markets use pricing to communicate value
- Organizations transfer and promote people
- Instrumentation and control systems monitor events

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Terms and Concepts – Activities Knowledge Utilization

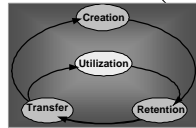


- The various ways that knowledge is used to
 - Enable actions
 - Support decisions
- KU Events provide the rationales and value propositions that drive knowledge flows

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Terms and Concepts – Activities Utilization Activities



- People trade stocks, buy cars, get married
- Airplanes fly
- Software systems execute algorithms
- Cells divide
- Organizations create value
- Cultures squash radicals

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Module 2: KM Tool Characterization Framework Overview

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KMTCF Overview Framework Developed to

- Organize and classify “KM tools” based on their impacts on the various elements of Knowledge Flows
- Assess the performance characteristics of other tools used in Knowledge systems
- Combat the conceptual clutter

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KMTCF Overview What is “The Framework”

- A set of analytical principles that target the ways that tools interact with and impact
 - Agents
 - Artifacts
 - Activities
- Associated worksheets that package key concepts and focus analysis

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KMTCF Overview
Tool Type

- The KMTCF differentiates three kinds of tools
 - Technology
 - Method
 - Practice
- Each type of tool has different characteristics and limitations

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KMTCF Overview – Tool Type
Technologies

- Commonly associated with automated and mechanized agents
- Examples
 - Hardware
 - Software
 - Associated data

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KMTCF Overview – Tool Type
Method

- Commonly associated with individuals, small groups, and specialized context-specific rules
- Comprises specific, well-engineered ways of behaving
 - Formula
 - Procedure
 - Protocol

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KMTCF Overview – Tool Type
Practice

- Usually associated with organizational and social agents
- Involves application of broadly accepted theories and methods
- Characterized by well-defined heuristics (ways of thinking)

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KMTCF Overview
Agent Impacts

- Who uses the tool and how?
- Who's behavior is affected through the application of the tool and how?
- Agent types
 - Individual Agents (people)
 - Automated Agents (machines)
 - Organizational Agents (organized collections of various agent types)

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KMTCF Overview
Organizational Impacts

- How are the different levels of the organization affected by this tool?
- The KMTCF differentiates three organizational levels
 - High-level
 - Mid-level
 - Low-level

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KMTCF Overview – Organization
High-level Impacts

Usually associated with

- Enterprise-wide initiatives
- Organization's mission
- Strategic goals and objectives
- Long-term impacts
- Organizational culture and values
- Policies

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KMTCF Overview – Organization
Mid-level Impacts

Usually associated with

- Individual business units or functions
- Tactical decisions
- Operations
- Programs
- Projects
- Procedures

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KMTCF Overview – Organization
Low-level Impacts

Usually associated with

- Task-level functions
- Work packages
- Individual actions and decisions
- Point-to-point communications

KMTCF Overview
Artifact Interactions

What knowledge artifacts does the tool interact with?

- What artifacts are used by (inputs to) the tool?
- What artifacts are output from (or affected by) the tool?

KMTCF Overview – Artifact Interactions
Artifact Types

- **Explicit Artifacts**
 - Have form and substance
 - Written, spoken, digital, etc.
- **Implicit Artifacts**
 - Incomplete and context-dependent
 - Could be made explicit
- **Tacit Artifacts**
 - Know but can't say
 - Can't make explicit

KMTCF Overview
Behavioral Impacts

What are the impacts of the tool in each activity area?

- Creation
- Retention
- Transfer
- Utilization

KMTCF Overview
FOCUS

Which interactions does the tool target?

- Agent (the tool enables actions and decisions; modifies agent behaviors)
- Artifacts (the tool is optimized around creation, retention, or transfer of artifacts)
- Behavior (the tool improves process efficiency or integrates processes)

Module 3: Practice Session

Practice Session

- List potential analysis topics
 - Methods
 - Practices
 - Technologies
- Form teams and pick topics
- Perform analysis
- Report findings

Module 4: Advanced Usage

Advanced Usage

The KMTCF is based on a more general conceptual framework which can be applied in a variety of ways

- Knowledge Engineering
- Gap Analysis
- Systems Development
- Marketing KM and IT Products

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Advanced Usage Knowledge Engineering

- The KMTCF focuses on policy-level impacts
- Alternatively, tools can be analyzed based on their internal mechanics
 - Functional deconstruction
 - Sub-unit relationships
 - Dependencies
- Such an approach is better suited to solving engineering and integration problems

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Advanced Usage Gap Analysis

Characterizing complex knowledge flows

- Clarifies distinctions between artifacts, agents, and behaviors
- Helps to illuminate both patterns and gaps
 - Unarticulated elements
 - Missing elements
 - Knowledge gaps and breakdowns

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Advanced Usage Systems Development

Mapping knowledge flows to automation opportunities

- Clarifies functional requirements
- Isolates integration points
- Validates the scope of development efforts
- Reduces instability of specifications
- Differentiates commercial tools

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Advanced Usage Marketing KM and IT Products

Tool vendors can use the characterization framework to

- Characterize customer demand
- Distinguish where both existing and new tools fit into the KM solution space
- Overcome "re-labeling" complaints
- Differentiate products and services in a well-grounded way
- Identify strategic opportunities for product evolution and increased customer value

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Wrap -Up

- The value of a specific tool results as much (if not more) from how it is applied than from the tool's internal characteristics
- Better characterization of problem spaces and potential solutions
 - Improves functionality
 - Speeds results
 - Increases the odds of organizational success

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KM Tool Characterization Framework Worksheet

Tool Name	
------------------	--

Scenario	What is the business and/or organizational context?
For what business problems or functions is the tool being considered?	

Type of Tool	What kind of tool is this? (Pick One)
<input type="checkbox"/> Technology Hardware, software, and associated data (automated, mechanized)	Rationale
<input type="checkbox"/> Method Strict rules, formula, and algorithmic behavior (ways of behaving)	
<input type="checkbox"/> Practice Characterized by well-defined heuristics (ways of thinking)	

Agent Impacts	Who uses the tool and for what?																				
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%; padding: 5px;">Agent Type</th> <th style="width: 5%; padding: 5px;">L</th> <th style="width: 5%; padding: 5px;">M</th> <th style="width: 5%; padding: 5px;">H</th> <th style="width: 25%; padding: 5px;">Description</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Individual Agents People</td> <td style="text-align: center; padding: 5px;">F</td> <td style="text-align: center; padding: 5px;">F</td> <td style="text-align: center; padding: 5px;">F</td> <td></td> </tr> <tr> <td style="padding: 5px;">Automated Agents Hardware, software, and machines</td> <td style="text-align: center; padding: 5px;">F</td> <td style="text-align: center; padding: 5px;">F</td> <td style="text-align: center; padding: 5px;">F</td> <td></td> </tr> <tr> <td style="padding: 5px;">Organizational Agents Organized collections of agents</td> <td style="text-align: center; padding: 5px;">F</td> <td style="text-align: center; padding: 5px;">F</td> <td style="text-align: center; padding: 5px;">F</td> <td></td> </tr> </tbody> </table>	Agent Type	L	M	H	Description	Individual Agents People	F	F	F		Automated Agents Hardware, software, and machines	F	F	F		Organizational Agents Organized collections of agents	F	F	F		
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Who's behavior is affected through the application of the tool and in what ways?																					
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Organizational Agents Organized collections of agents	F	F	F																		

KM Tool Characterization Framework Worksheet

Tool Name	
------------------	--

Organizational Impacts	How are the different levels of the organization affected by this tool?			
Organizational Level	L	M	H	Description
High-level Enterprise-wide, strategic goals and objectives, long-term impacts	F	F	F	
Mid-level Individual business unit or function, program and project-level functions	F	F	F	
Low-level Task-level, work packages, individual decisions and actions	F	F	F	

Artifact Interactions	What knowledge artifacts does the tool interact with?			
Inputs (used by)	L	M	H	Description and input specifications
Explicit Written, spoken, digital, etc.	F	F	F	
Implicit Incomplete and context-dependent	F	F	F	
Tacit Know but can't say; can't make explicit	F	F	F	
Outputs (or affected by)	Description, output specifications, and transformations			
Explicit Written, spoken, digital, etc.	F	F	F	
Implicit Incomplete and context-dependent	F	F	F	
Tacit Know but can't say; can't make explicit	F	F	F	

KM Tool Characterization Framework Worksheet

Tool Name	
------------------	--

Behavioral Impacts	What are the impacts of the tool in each activity area?			
Activity Area	L	M	H	Description
Creation Development, capture, acquisition	F	F	F	
Retention Storage, maintenance, availability	F	F	F	
Transfer Transport, translation, communication	F	F	F	
Utilization Enabling actions and decisions	F	F	F	

Focus	Which set of interactions does the tool target? (Pick One)
<input type="checkbox"/> Agents Tool enables actions and decisions; modifies agent behaviors	Rationale
<input type="checkbox"/> Artifacts Tool is optimized around creation, retention, or transfer of artifacts	
<input type="checkbox"/> Behavior Tool improves process efficiency, integrates processes	

KM Tool Characterization Framework Summary

Tool Name				
Scenario	What is the business context? For what business problem is the tool being considered?			
Type of Tool	What kind of tool is this?			
<input type="checkbox"/> Technology <input type="checkbox"/> Method <input type="checkbox"/> Practice				
Agent Impacts	L	M	H	Who uses the tool and how?
Individual Agents	F	F	F	
Automated Agents	F	F	F	
Organizational Agents	F	F	F	
				Who's behavior is affected through the use of the tool and how?
Individual Agents	F	F	F	
Automated Agents	F	F	F	
Organizational Agents	F	F	F	
Organizational Impacts	How are the different levels of the organization affected by this tool?			
High-level	F	F	F	
Mid-level	F	F	F	
Low-level	F	F	F	
Artifact Interactions	What knowledge artifacts are used by (input to) the tool?			
Explicit	F	F	F	
Implicit	F	F	F	
Tacit	F	F	F	
				What knowledge artifacts are output from (or affected by) the tool?
Explicit	F	F	F	
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Behavioral Impacts	What are the impacts of the tool in each activity area?			
Creation	F	F	F	
Retention	F	F	F	
Transfer	F	F	F	
Utilization	F	F	F	
Focus	Which set of interactions does the tool target?			
<input type="checkbox"/> Agents <input type="checkbox"/> Artifacts <input type="checkbox"/> Behavior				