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

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

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

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

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

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

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

Module 1: 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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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.

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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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

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

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

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

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?

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

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

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
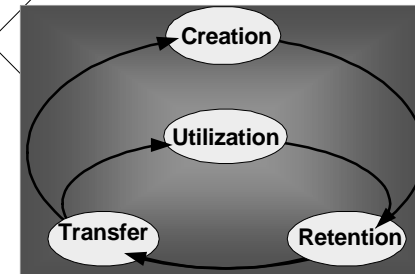
Source: General Knowledge Model, Newman and Conrad, 1999

Terms and Concepts – Activities
Knowledge Creation
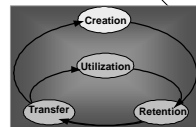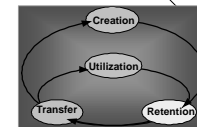
Any activity that brings new knowledge into the system
- Development
- Discovery
- Capture
- Acquisition
- Etc.

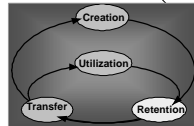Terms and Concepts – Activities
Knowledge Retention

- 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

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

Terms and Concepts – Activities
Knowledge Transfer
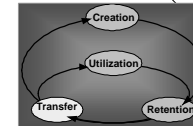
Knowledge transfer moves knowledge from one agent to another
- From knowledge developers to knowledge users
- From one work group to another
- From suppliers to vendors and vendors to customers

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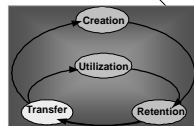
- People tell stories
- Mentors teach
- Markets use pricing to communicate value
- Organizations transfer and promote people
- Instrumentation and control systems monitor events

Terms and Concepts – Activities
Knowledge Utilization
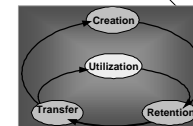
- The various ways that knowledge is used to
  - Enable actions
  - Support decisions
- KU Events provide the rationales and value propositions that drive knowledge flows

Terms and Concepts – Activities
Utilization Activities
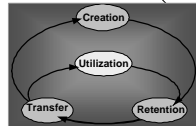
- People trade stocks, buy cars, get married

- Airplanes fly

- Software systems execute algorithms

- Cells divide

- Organizations create value

- Cultures squash radicals

Module 2:
KM Tool Characterization
Framework Overview

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

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

Slide 37

First-generation Rendering

	Tool				Activity Phase				Activity Level			Agent Type			Artifact Type			Focus		
	Name	Practice	Method	Technology	Creation	Retention	Transfer	Utilization	High-Level	Mid-Level	Decision or Action	Individual	Automated	Organizational	Explicit	Implicit	Tacit	Agent	Artifact	Process

Slide 38

Current Rendering

- Form-based
- Includes analytical support elements
  - Focus questions
  - Low, medium, high impact rankings
  - Fields for rationale and descriptions
- Two versions
  - Three-page worksheet
  - One-page summary

Slide 39

Analysis Principals

- Keep it simple
- OK to work in non-linear fashion
- Expect individuals to vary in their interpretations and analysis
- Only analyze to point of differentiation
  - Articulate type of impact (result)
  - Not mechanics driving impact (process)

Slide 40

Scenario

- Define an application scenario for the tool being characterized
- What is the organizational and/or business context?
- For what business problems or functions is the tool being considered?

Tool Type

- The KMTCF differentiates three kinds of tools
  - Technology
  - Method
  - Practice

- Each type of tool has different characteristics and limitations

Technologies

- Commonly associated with automated and mechanized agents

- Examples
  - Hardware
  - Software
  - Associated data

Method

- Commonly associated with individuals, small groups, and specialized context-specific rules

- Comprises specific, well-engineered ways of behaving
  - Formula
  - Procedure
  - Protocol

Practice

- Usually associated with organizational and social agents

- Involves application of broadly accepted theories and methods

- Characterized by well-defined heuristics (ways of thinking)

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)

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

High-level Impacts

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

Mid-level Impacts

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

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

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KMTCF Overview – Organization
Low-level Impacts

Usually associated with

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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

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

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

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

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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- Better characterization of problem spaces and potential solutions
  - Improves functionality
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  - Increases the odds of organizational success

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)

	Rationale
F **Technology** Hardware, software, and associated data (automated, mechanized) F **Method** Strict rules, formula, and algorithmic behavior (ways of behaving) F **Practice** Characterized by well-defined heuristics (ways of thinking)	

Agent Impacts — Who uses the tool and for what?

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	

Who's behavior is affected through the application of the tool and in what ways?

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	

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

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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)

F **Agents**
Tool enables actions and decisions; modifies agent behaviors

F **Artifacts**
Tool is optimized around creation, retention, or transfer of artifacts

F **Behavior**
Tool improves process efficiency, integrates processes

Rationale

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	

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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?

☐ Technology
☐ Method
☐ Practice

Agent Impacts — Who uses the tool and how?

	L	M	H
Individual Agents	☐	☐	☐
Automated Agents	☐	☐	☐
Organizational Agents	☐	☐	☐

Who's behavior is affected through the use of the tool and how?

	L	M	H
Individual Agents	☐	☐	☐
Automated Agents	☐	☐	☐
Organizational Agents	☐	☐	☐

Organizational Impacts — How are the different levels of the organization affected by this tool?

	L	M	H
High-level	☐	☐	☐
Mid-level	☐	☐	☐
Low-level	☐	☐	☐

Artifact Interactions — What knowledge artifacts are used by (input to) the tool?

	L	M	H
Explicit	☐	☐	☐
Implicit	☐	☐	☐
Tacit	☐	☐	☐

What knowledge artifacts are output from (or affected by) the tool?

	L	M	H
Explicit	☐	☐	☐
Implicit	☐	☐	☐
Tacit	☐	☐	☐

Behavioral Impacts — What are the impacts of the tool in each activity area?

	L	M	H
Creation	☐	☐	☐
Retention	☐	☐	☐
Transfer	☐	☐	☐
Utilization	☐	☐	☐

Focus — Which set of interactions does the tool target?

☐ Agents
☐ Artifacts
☐ Behavior