

# Knowledge Management and E-Learning

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## Agenda

- Convergence of KM and E-Learning
- Two Dimensions of KM and E-Learning
  - Taxonomic – Knowledge Organization
  - Facilitation – Knowledge Transfer
- The Pharmaceutical Context
- The Infrastructure Solution
  - Knowledge Architecture and Intellectual Infrastructure
  - KA, KM, and E-Learning: Infrastructure Components

## Convergence of KM and E-Learning

- Gartner Group: “In 2 years E-learning will be a subset of Knowledge Management.”
- “Or Knowledge Management will be a subset of E-learning.”
- That was three years ago.

## **Convergence of KM and E-Learning: E-Learning New Directions**

- Formal learning to informal learning (10-15% in formal)
- Blur lines formal and informal, training and performance support
- Authoring: from teacher based to distributed authoring
- Evaluation: from testing to adaptation
- Blended training – mix of techniques class and e-learn
- Timely delivery in smaller chunks, individualized
- LMS systems – tied into other enterprise systems – document management, CRM. Events like arrival of a new document and trigger delivery of learning content.

## **Convergence of KM and E-Learning: KM New Directions**

- KM - from theory to practice
- KM - from communication to collaboration, Communities of Practice, Expertise location
- KM - from static categorization to dynamic categorization
- KM – CM and taxonomies, distributed authoring
- KM – new models from personas to social networks
- From KM to Knowledge Architecture

## Convergence of KM and E-Learning

- Not yet integrated, or fully appreciated, developed
  - KM is essential to the Pharmaceutical Industry
  - Few companies have a KM roadmap
  - 45% of Pharma companies have no permanent KM positions
- KM – driven by strategic planners, E-Learning driven by specific lines of business or HR
- KM suffered from being defined too vaguely, E-Learning as too narrow a focus
- KM a management fad, E-Learning is an HR overhead cost

## Convergence of KM and E-Learning

- Barriers to KM
  - User Acceptance
  - Lack of senior management support
  - Cultural issues – hoarding, lack of incentives, etc.
- Barriers to Training
  - High Cost, No connection to job
- Critical Barrier – lack of the proper infrastructure
  - Projects evaluated, implemented piecemeal
  - Lack of organizational foundation – people, content
  - Inefficiency of independent, overlapping efforts

## Two Dimensions E-Learning and KM

- Taxonomic – Knowledge Organization
  - Content – Metadata, taxonomies, controlled vocabularies, thesauri, etc.
  - Communities – Maps and Social Networks
  - Activities – research, application behaviors, information behaviors
- Knowledge Transfer – Facilitation
  - Communities Formal and Informal
  - Performance support, classroom, E-Learning
  - Intelligent Enterprise

## Taxonomic – Knowledge Organization - KM

- Metadata: Dublin Core+
  - CM functions: Language, Identifier, Rights
  - Combination functions: Publisher, Author
  - Subject matter functions: keywords, descriptions
    - Minimum need controlled vocabularies
- Contextual
  - DocumentObjectType, AudienceType

## Taxonomic – Knowledge Organization - KM

- Taxonomies, Classification, Categorization
  - Mesh, MedDRA – too much and too little
  - Dynamic mapping of taxonomies
  - Integration with business and research processes
- Facets and entities
  - People, Companies, Compounds, Geography
  - Multiple views into content
  - Dynamic Mapping of facets

## Taxonomic – Knowledge Organization – E-Learn

- SCORM+
  - Interactivity type and level
  - Semantic Density
  - Learning Context (calculated)
  - Typical Learning Time
- Learning Objects
  - Content and Metadata tag
  - Reusable, flexible, easy to update and customize
  - Requires extensive design
- Importance of Context
  - Rules for combining

## Taxonomic – Knowledge Organization – KM and E-Learn

- Knowledge Objects
  - XML standards allow integration of KM and E-Learning
  - Allows answers not just lists of documents
  - Related sets of concepts, entities
- Bloom's Taxonomy
  - Types of Knowing, cognitive behaviors
  - Comprehension, Application, Analysis, Synthesis, Evaluation
- RDF and Semantic Web
  - SubClassOf, seeAlso, IsDefinedBy
  - isRelatedTo, isKindOf

## Knowledge Transfer - KM

- Organization foundation
  - Map of formal and informal communities
  - Social Network Analysis
  - Community specific vocabularies
  - Integrate with knowledge objects, metadata
- Communities of Practice
  - Variety of Activity types
    - Communication and Collaboration
  - Variety of Interest types
    - Vaccines, Research processes, Scuba
  - Variety of communication channels
    - Discussion Groups, chat, email, formal conferences

## Knowledge Transfer – E-Learn

- Just-In-Time Training / Just-For-Me Training
  - Train people where to find training
  - Real time performance monitoring
  - Need powerful user and community models
- Performance Aids
  - 5 Minute Meetings
  - In Context Job Support
  - Smart Applications

## Knowledge Transfer - KM and Training

- Embedded Learning
  - Communities of Practice
    - Move experts into real world
  - Collaboration
    - Capture knowledge as its created and transferred.
  - Expertise Location and Mentoring Programs
  - Agents – Personal and Communal
  - Story Telling
    - Facilitate transmission of good stories
    - Capture and Disseminate

## The Pharmaceutical Context

- \$800M over 10-15 year drug discovery, development, approval lifecycle
- The key competitive advantage is the research and development of new intellectual property.
- Need to retain knowledge of key people – high turnover
- Globalization requires distance collaboration
- Improve R&D productivity and shorten product life cycle
- Need for innovation, efficiency, deep knowledge – reduce mistakes
- Importance of negative results (Nature, April 10)

## The Pharmaceutical Context

- Discovery
  - Collaboration, sharing of tacit knowledge – specific knowledge, discovery processes, partnerships
  - Explicit – Lab notebooks, competitor intelligence, Gene sequence DB
- Development
  - Document management – drug approval
  - Pre-Clinical & Clinical Trials DB
  - Unstructured content – word, etc.

## The Pharmaceutical Context

- Legal & Patents
  - Management of patents, copyrights, trade secrets
  - Significant tacit knowledge
  - Competitor intelligence – patents, pipelines,
  - Publications
- Production & QA
  - Tacit Knowledge – production and engineering know how
  - Team “knowledge”
  - Special presentation issues

## The Pharmaceutical Context

- Administration
  - Finance, HR, Corporate Communication, Library, IT
  - Tacit – HR people, librarian subject matter and organization
  - Finance reporting, library collections
  - IT and HR manuals
- Sales & Marketing
  - Best Practices sharing in selling and marketing
  - Special issues of information access
  - Know how skills, key people relationships
  - Best practice DB, marketing presentations, documented market insight

## The Pharmaceutical Context: 6 Dimensions

- More need for an integrated solution
  - Different information and knowledge needs
  - Different mix of structured and unstructured content
  - Different information behaviors
    - Known item, research, time scales, presentation
- Research, lab workers, production, sales, etc.
  - Range of formal and informal communities
  - Range of types of content, questions, outcomes
  - Yet need for communication, coordination
- Answer not new software or KM model of knowledge flows

## Intellectual Infrastructure Solution

- Establish an infrastructure group with a mandate
  - The people, processes, and technology of designing, implementing, and applying the intellectual infrastructure of organizations.
- What is an intellectual infrastructure?
  - The poor neglected cousin of technology and organizational infrastructures
  - It is just the set of activities that deal with creating, capturing, organizing, visualizing, presenting, utilizing, understanding, the information part of the information age.

## Why an Infrastructure Solution?

- Foundation for E-Learning and Knowledge Management
- Immanuel Kant
  - Concepts without percepts are empty
  - Percepts without concepts are blind
- Knowledge Management
  - KM without applications is empty (Strategy Only)
  - Applications without KA are blind (IT based KM)
    - Training confined to the classroom

## Why an Infrastructure Team of General Specialists?

- Conceptual / Taxonomic Foundation
  - Anyone can organize information – card sorts, etc.
    - Develop taxonomies – can't be done by software or SME's
    - Metadata, vocabularies – keywords don't work – why?
  - Need a combination of formal and informal
    - Hierarchy, lattice, semantic networks, folders, etc.
    - Important to know the differences
  - Quality Metrics
    - Corpus, Coverage, Nomenclature, terminology, dependency
    - Mixed classes, verbal forms, bad speciation, etc.
    - Bell Curve, balance of depth and width
  - Cognitive Difference – Geography of Thought
    - Panda, monkey, banana

## Why an Infrastructure Team of General Specialists?

- E-Learning Intellectual Infrastructure
  - Smaller learning chunks require more overhead
    - need blend of central group, SME's, and software to help automate
    - one person defines a chunk as two hours of content, another as 15 minutes.
  - Instructional designer – focus on serving as the learning architects, developing templates that support effective learning.
  - Need to create common vocabulary & knowledge organization for rich set of interconnected content and people
    - Courses, performance support, discussions and collaboration groups, links to mentors and experts

## Intellectual Infrastructure Services

- Knowledge Architecture Audit / Social Network Analysis
- Knowledge Creating
  - Innovation, E-learning, LMS
  - Content Management
    - Taxonomic Model, Distributed Categorization
- Knowledge Sharing / Transmission
  - Collaboration, Retrieval – content and experts
- Knowledge Using
  - Smart Applications, Portals
  - CRM – training your customers
  - Data warehouse, text mining, business intelligence

## Intellectual Infrastructure Services

- Infrastructure Activities
  - Integrate taxonomy across the company
    - Content, communities, activities
    - Link documents that relate to safety with the training curriculum.
  - Design content repositories, update and adapt categorization
  - Package knowledge into K objects, combine with stories, learning histories
  - Metrics and Measurement – analyze and enhance
  - Knowledge Architecture Audit
    - Enterprise wide
    - Project scale

## Intellectual Infrastructure Services

- Knowledge Transfer – need for facilitators
  - even Amazon is moving away from automated recommendations
- Facilitate projects, KM Project teams
  - Core group of consultants and K managers
- Facilitate knowledge capture in meetings
- Answering online questions, facilitating online discussions, networking within a community
- Design and run forums, education fairs, etc.
- Curriculum developers work with content experts, identify training requirements, design learning objectives, develop courses

## Roles and Functions

- Knowledge Architect and Learning Object Designers
- Knowledge Engineers and curriculum developers
- Knowledge Facilitators and Trainers
- IT, Web developers, application programmers
- Librarians and information architects
- Business analysts and project managers
- Corporate Communication writers and editors

## Organization and Location of the Team

- Central, Dedicated Department
  - Cross Organizational
- Confusion: CIO reporting to a VP of Info Man.
- IT, HR, Corporate Communication, Library, Training
- Centrally planned balance of central and distributed elements
  - Foundation for SME's & practical, real world input
  - Multidisciplinary teams
- What's in a name? Knowledge Architecture

# The Contextual Desktop

- Document or List of Documents or Application Screen
  - Before you view:
    - Agent keeps you up to date
    - System knows your history, your connections to content and communities, your preferences
    - Presents view – text/visual
    - Knows history of other members of your various communities
  - When you add/change content
    - Suggests categorization value, metadata values
    - Routes to appropriate content and communities
    - Prompt on unusual connections
      - Pre-existing, categories
      - Regulatory issue
      - Q – Route to experts?
- Taxonomy Location
- Facets
  - People, Companies
- Related Content
  - Regulatory, Patents, BI-CI
  - Lab Notebooks
  - News Stories, outside content, PubMed
- Dictionaries, PDR, Databases
- Experts
  - Ask Questions, Chat
- Communities
  - Search, Chat, Email
- Classes
- Performance Aids
- Stories

## Infrastructure Solutions

- Implementation Issues – Yes but:
  - Improved software
    - CM and LMS, auto-categorization and metadata generation
    - Active Collaboration, performance monitoring
- Economic Issues – Yes but:
  - Pharmaceutical – only permanent advantage is intellectual
- Vision Issue
  - Importance of infrastructure – imagine not organizing your company or your research
  - Why do you think you don't have to organize your intellectual assets? Or worse have 100 organizational schemes.

# Questions?

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