KM in Disguise:

Lessons from a decade of supporting emergent knowledge processes

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Agenda

- Experience Base
- Emergent Knowledge Processes
- Lessons & Insights
  - Flexibility & Adaptability
  - Embeddedness
  - Measures of success
  - Knowledge obsolescence
  - Willingness to share
  - Learning

Experience Base

- 21 Knowledge Intensive Systems (and counting)
- From 1989 – present, at JPL
- Development Stage
  - Concept/Demo, Implementation, Operations
- Current Status
  - Stalled --> Wildly successful and still in operation
- IT Component
  - Web, DB/KB, Doc Mgmt, Data Collection & Acquisition, Automation
- Type of Knowledge
  - Process, Declarative, Heuristic, Story/Case
- Purpose
  - K-Capture, K-Sharing, Process Support, Process Automation, Learning

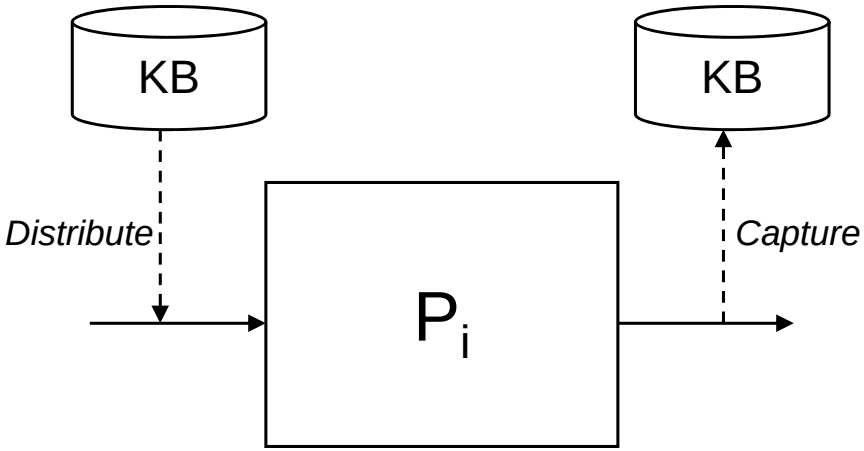
18 years of K-Systems

			Dev Stage				IT Components					Type of Knowledge				Purpose				
	System	Year	Concept/Demo	Implementation	Ops	Current State	Web I/F	DB/KB	Doc Mgmt	Data Collection/ Acquisition	Automation	Process	Declarative	Heuristic	Story	Knowledge Capture	Knowledge Sharing	Process Support	Process Automation	Learning
	DSS-14 Maint	1989	X			Not Funded						X	X	X				X		
	OMP	1989	X			Proof of concept		X		X	X	X	X	X				X	X	
	Thermal Vac	1989	X			Not Funded						X	X	X		X	X			
	OMP-26	1992	X	X	X	Retired		X		X	X	X	X	X				X	X	
	DSS-13 M&C	1993	X	X	X	Retired		X		X	X	X						X	X	
	LMCOA	1993	X	X	X	Transitioned		X		X	X	X		X		X		X	X	
	DNP Proj Lib	1996	X	X	X	Transitioned	X	X	X	X			X				X	X		
	MECA Ops	1999	X	X	X	Transitioned						X	X	X		X	X	X		
	Crit K Cap	2000	X			One-time only						X	X	X	X	X	X			X
	DKC	2000	X			Not Funded				X		X	X	X		X	X	X		
	KRI	2000	X			Analysis Only						X		X						
	LLIS	2000	X	X	X	Transferred	X	X		X			X		X	X	X			X
	PKO	2000	X			Not Funded	X	X	X	X			X	X		X	X			
	JPL 101	2003	X	X	X	Languishing	X	X		X		X	X		X	X	X			X
	Tech Qs	2001	X	X	X	Repurposed	X	X				X	X	X		X	X	X		X
	SPIS	2003	X	X	X	Active	X	X	X	X		X	X				X	X		
	Legacy Rev	2004	X			Analysis						X	X		X	X	X			X
	OnLine Rev	2005	X	X	X	Active	X	X	X	X		X					X	X		
	Prop Trk	2006	X	X	X	Active	X	X		X		X	X				X	X		
	eRIDs	2007	X	X	X	Active	X	X		X		X	X				X	X		
	OnLine B&P	2007	X	X		in Development	X	X		X		X	X	X			X	X		

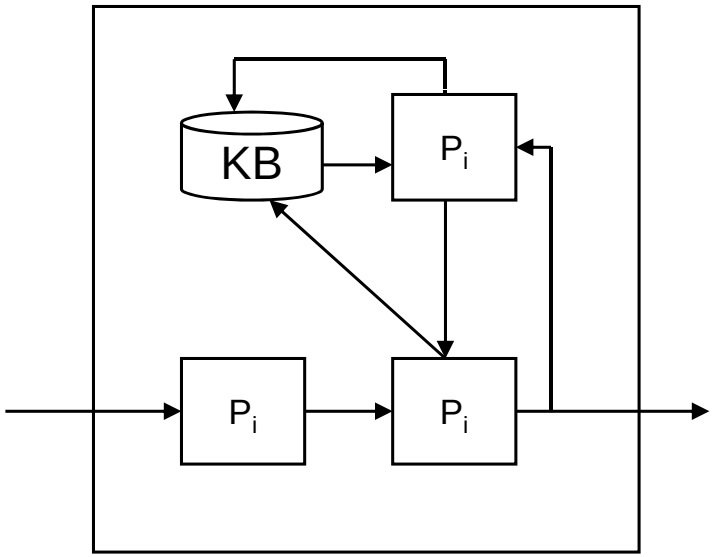
Emergent Knowledge Processes

- Markus, Gasser, Majchrzak (2002). *A design theory for systems that support emergent knowledge processes*. MIS Quarterly. 26(3)179-212.
- Processes in which problem interpretations, deliberations, and actions unfold unpredictably and equivocally in interaction with others
  - E.g., R&D, New Product Development
- Design Principles:
  - Design for customer engagement
  - Design for knowledge translation through radical iteration with functional prototypes
  - Design for off-line action
  - Integrate expert knowledge with local knowledge sharing
  - Design for implicit guidance through a dialectical development process
  - Componentize everything, including the knowledge base

Process



KM Utilities



Embedded KM

Knowledge

- Data - Information - Knowledge
  - Bits vs. Things vs. Meaning
    - Example: Maps
  - Context
  - Emotional component
  - “Something More”
    - DNP ~invention~ of KM

Emergent

- Behavior emerges with use and changes over time
- Users emerge and change over time
- Knowledge emerges and changes over time
  - Knowledge boundaries are fuzzier than process or system boundaries

Lessons & Insights

- Measures of Success
- Building and Maintaining a KMS
- Willingness to Share
- Learning

Tangible Measures of Success

- Metrics
  - IT performance measures: Usefulness, Usability, Performance
  - Hits vs. Visits vs. Visitors
- Reasonable expectations
  - Who will use the system, how often, under what circumstances? Mandatory vs. voluntary use.
  - What constitutes saturation?
- Outcomes
  - Process improvement: time, resources, new capability
  - Return on investment: “saved hours fallacy”

Intangible Measures of Success

- Return on Investment
  - Commissioned vs. Sold
  - “Saved Hours” fallacy
- De facto way of doing business
- Volume of screaming if it’s not there
- Promotional/enforcement effort required to maintain use
- Positive customer feedback
- Gravity effects (Ross, et al., 2001)

Building & Maintaining KMS

- Flexibility & Adaptability
  - Tailorable, extensible: “other” “it depends”
  - Avoid “always” and “never” assumptions
  - Open vs. proprietary interfaces
  - Hidden process-based assumptions
  - Modular functionality
- Process leverage points
  - Easy places to collect data/info/knowledge
- Knowledge obsolescence
  - Capture in way to extend lifetime
- Embeddedness
- Spring cleaning

Willingness to Share

- Common Myth: People are unwilling to share their knowledge
  - e.g., power, economic value, competition, spite, fear, …
- In my experience: Not true
  - Difference between sharing and publishing
  - Non user-natural representations
  - Concerns about mis-use (control, credit)
  - Abuse of time
  - Recipient issues, need for foundational knowledge

Learning

- Knowledge gained through variety of means, but…
- Expert Knowledge gained through experience
- Need to explicitly address how a given KMS supports learning, e.g.,
  - Transfer of best practices
  - Reuse for Innovation
  - Experience building
- “Better User” complaint

Closing Thoughts

- Significant challenges in building KMS to support emergent knowledge processes
- Flexibility, adaptability, and an understanding of the people, processes, and products are critical

Questions? Comments?

Back-up Materials

TQDB Evaluation Approach

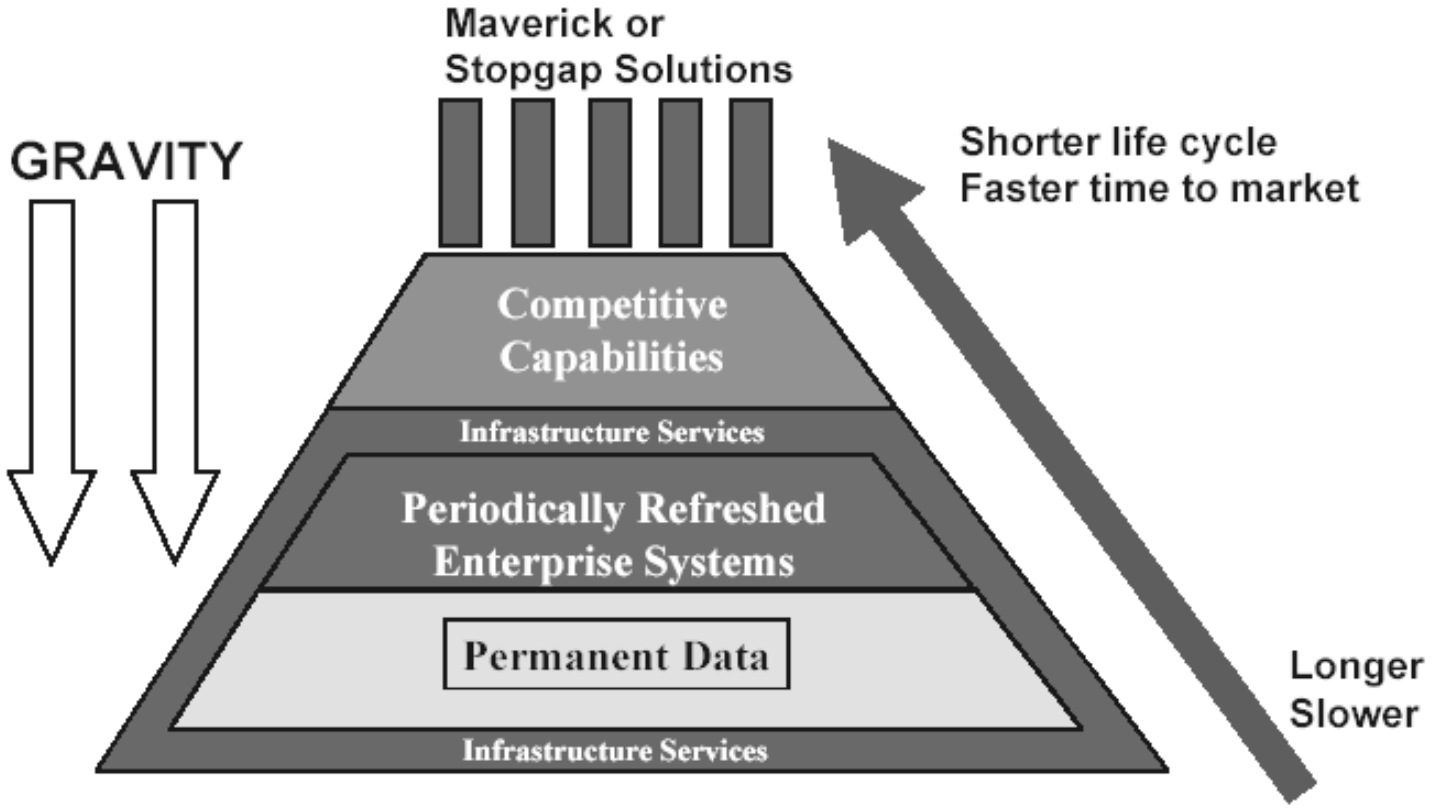
Evaluation Method	Description	Indication	Notes
Usage statistics (Users)	Obtained from server logs. Average 20-30 users/month, consistent with target users and relevance window	Positive for usefulness for target users.	Interpreted as a need to publicize rather than change the system
On-Line Survey (Users)	Accessible from TQDB website, based on Davis (1989) to measure perceived usefulness and usability. Very low response rate (<10%)	Positive for both usefulness and usability	
Email-based feedback form (Users)	Available from TQDB website. Open ended comments with low (10-20%) number of users	Strong positive feedback on usability and usefulness. Requests to increase content to cover additional domains	Many respondents indicated they “didn’t have time to take the survey – so they sent the email instead”
Executive Advocacy (Management)	Executive level support in obtaining maintenance funding and reaffirming importance of contributing content	Positive indication of overall perceived value	
External Requests (future users)	Requests from NASA employees external to JPL for access to content	Positive indication of perceived usefulness	

JPL 101 Evaluation Approach

Evaluation Method	Description	Indication	Other
Beta-Test	20 subjects taking paper version of quiz. Used to evaluate characteristics of the questions and obtain feedback on length of quiz, mix of questions, potential value of resource	Feedback on design of content incorporated into operational system. Generally positive feedback on concept, with some negative	
Informal user sessions	Informal meetings held with groups of 2-5 people to get feedback on overall concept and perceived value	Extremely enthusiastic response indicating high perceived value and multiple offers of advocacy	Routinely received offer to submit questions (content) for future versions
Usage statistics and quiz results On-line survey Email Feedback Voluntary contribution of questions	Data not yet available	Will be collected during 12 week initial operations period	

Ross, et al 2001 Model

Generic IT Architecture for the 21st Century



Source: MIT - CISR
Working Paper No. 324.

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