The Power of a Question:  
A Case Study of Two Organizational Knowledge Capture Systems  

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Overview  

- Exploratory case study of two knowledge resources  
- Knowledge transfer from practitioner perspective  
- Use of Questions to represent knowledge  
- Descriptions of Technical Questions Database and JPL 101  
- Methods for evaluation  
- Research Questions
Exploratory Case Study

- Appropriate when uncertain about some major aspect of a “real” study (Yin, 1993)
  - Questions to be asked
  - Hypotheses of study
  - Data collection methods
  - Access to data
  - Data analytic methods
- Framework: What can be learned from the experience of implementing these successful knowledge resources?
  - Given that so many knowledge management efforts aren’t successful?
  - How do we apply this in future efforts?

Based on Yin (1993, 1994)

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Knowledge Transfer

- Knowledge sharing: process by which an entity’s knowledge is captured (Appleyard, 1996)
- Knowledge reuse: process by which an entity is able to locate and use shared knowledge (Alavi & Leidner, 2001)
  - In innovative contexts, involves adaptation, e.g. “reinvention” (Rice & Rogers, 1980) and “combinative capabilities” (Kogut & Zander, 1992)
  - Affected by characteristics of the knowledge and characteristics of the participants in the knowledge exchange
- Knowledge systems act as intermediaries for knowledge transfer between the original source and the end user.

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Use of Questions

- Few knowledge representations are based on questions:
  - Frequently Asked Questions (FAQs)
    - Based on commonly occurring concerns
    - Emergent
    - Highly procedural
  - Navigation aids
    - Classic “who-what-when-where-how-why” structure
  - On-line Quizzes
    - E.g., NY Times
- Potential benefits
  - Engages users
  - Approximates Q&A protocol of talking to expert
  - Instigates thinking processes and contextualization

Description

- Purpose: Support knowledge transfer of JPL-specific knowledge across the organization
- Use JPL intranet for delivery
- Augment existing resources
  - E.g., Process documentation, professional development materials
- System Goals:
  - Ensure content quality
    - Minimize maintenance and knowledge acquisition efforts
  - Support scanning as well as deeper access
  - Engage the users
Technical Questions DB

Create a database of peer review questions for key laboratory technical disciplines

- Initiated in 1998 by upper management
- "Mind tickler" technical questions in disciplines applicable to flight projects
  - That could be asked during the design process or at a review
  - With the purpose of identifying and preventing problems
- Primary user: technical & line personnel working flight projects

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TQ DB Scenario
JPL 101

- Fundamental knowledge about JPL that employees should know
- Access to areas of interest beyond individual's normal work environment
- Engaging way of connecting people to resources
- In partnership with JPL Library, Internal Communications, and Human Resources

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Example Q&A

Question:
- Multiple choice
- Varying difficulty
- 5 per quiz

Answer:
- Identify correct answer
- Point to additional information

Wrong Answers:
- Use as entry point to provide additional information

Where is the Carl Sagan Memorial Station?
- a) Ares Vallis, Mars
- b) JPL mall wall
- c) Aboard Voyager spacecraft
- d) 65 N. Catalina Avenue, Pasadena

Correct Answer: a) Ares Vallis, Mars
The Pathfinder Lander was formally named the "Carl Sagan Memorial Station" following the successful touchdown in the Ares Vallis region on Mars - refer to this JPL Universe article (7/11/97) or the Mars Pathfinder Web site for more information.

The other answers are also associated with Carl Sagan:
b) The JPL mall wall, located northeast of the fountain in the JPL mall, was dedicated to Dr. Sagan.
c) The Voyager spacecraft carries with it a gold disk containing greetings from the people of Earth. Dr. Sagan was instrumental in developing the content on the gold disk. To see and hear the content of the disk, visit the Voyager display in von Karman Auditorium, or the Voyager Web site.
d) This is the address of The Planetary Society (TPS), which was co-founded by Dr. Sagan. Be sure to visit The Planetary Society’s Web site to view their tribute to him.

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Comparison

<table>
<thead>
<tr>
<th></th>
<th>TQDB</th>
<th>JPL 101</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target users</td>
<td>JPL technical personnel working in disciplines relating to space systems</td>
<td>JPL personnel across all categories</td>
</tr>
<tr>
<td>Goal</td>
<td>Improved system development</td>
<td>Improved general knowledge</td>
</tr>
<tr>
<td>Relevance Window</td>
<td>Primarily during preparation for system and subsystem design reviews. More generally throughout the design process</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Status</td>
<td>Operational for 3 years</td>
<td>About to go operational</td>
</tr>
<tr>
<td>Content Updates</td>
<td>Ad hoc/at least once per year</td>
<td>Weekly</td>
</tr>
</tbody>
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### TQDB Evaluation Approach

<table>
<thead>
<tr>
<th>Evaluation Method</th>
<th>Description</th>
<th>Indication</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage statistics (Users)</td>
<td>Obtained from server logs. Average 20-30 users/month, consistent with target users and relevance window</td>
<td>Positive for usefulness for target users.</td>
<td>Interpreted as a need to publicize rather than change the system.</td>
</tr>
<tr>
<td>On-Line Survey (Users)</td>
<td>Accessible from TQDB website, based on Davis (1989) to measure perceived usefulness and usability. Very low response rate (&lt;10%)</td>
<td>Positive for both usefulness and usability.</td>
<td></td>
</tr>
<tr>
<td>Email-based feedback form (Users)</td>
<td>Available from TQDB website. Open ended comments with low (10-20%) number of users</td>
<td>Strong positive feedback on usability and usefulness. Requests to increase content to cover additional domains.</td>
<td>Many respondents indicated they “didn’t have time to take the survey – so they sent the email instead.”</td>
</tr>
<tr>
<td>Executive Advocacy (Management)</td>
<td>Executive level support in obtaining maintenance funding and reaffirming importance of contributing content</td>
<td>Positive indication of overall perceived value.</td>
<td></td>
</tr>
<tr>
<td>External Requests (future users)</td>
<td>Requests from NASA employees external to JPL for access to content</td>
<td>Positive indication of perceived usefulness.</td>
<td></td>
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### JPL 101 Evaluation Approach

<table>
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<tr>
<td>Beta-Test</td>
<td>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</td>
<td>Feedback on design of content incorporated into operational system. Generally positive feedback on concept, with some negative</td>
<td></td>
</tr>
<tr>
<td>Informal user sessions</td>
<td>Informal meetings held with groups of 2-5 people to get feedback on overall concept and perceived value</td>
<td>Extremely enthusiastic response indicating high perceived value and multiple offers of advocacy</td>
<td>Routinely received offer to submit questions (content) for future versions</td>
</tr>
<tr>
<td>Usage statistics and quiz results</td>
<td>Data not yet available</td>
<td>Will be collected during 12 week initial operations period</td>
<td></td>
</tr>
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Research Questions

- Under what conditions are questions a valuable way to encode knowledge?
- How does knowledge representation impact the ease and effectiveness of knowledge solicitation?
- What is the value of spanning multiple disciplines in a single resource?
- To what extent can knowledge representation and system functionality be traded off in system design?
- What are the organizational communication implications of knowledge representations and resources?
- How do knowledge resources contribute to organizational discussions and social exchange?