



**Jet Propulsion Laboratory**  
California Institute of Technology

# KM Strategic Planning

## The Deliberate Approach vs. the Emergent Approach

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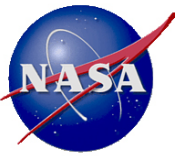
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# NASA/Caltech Jet Propulsion Laboratory

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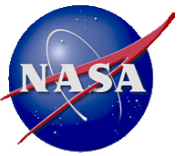
- JPL is the lead NASA Center for the unmanned exploration of the solar system
  - JPL has 38 missions now in development or operation
- A Federally Funded Research & Development Center (FFRDC)
  - JPL is managed by the California Institute of Technology (Caltech), a private university
  - The JPL facilities are owned by NASA
  - So JPL is both a NASA Center and a NASA contractor
- We maintain a mix of in-house and subcontracted projects
  - In-house permits us to maintain technical capabilities
  - Major system contractor (e.g., Lockheed Martin) for systems that are lower risk, missions that have been done before



# How We Made the Case for KM at JPL

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1. Today, corporate investment in intellectual capital may exceed that in physical capital (equipment and facilities)
2. Restoring knowledge that we fail to retain is costly
  - Also risky, because the heritage knowledge had already been proven in ground test and spaceflight
3. Uniquely, JPL can't obtain lost knowledge from elsewhere
  - Who else designs Mars landings, autonomous spacecraft?
4. Critical expertise may be lost due to employee turnover
  - NASA engineers over age 50 outnumber <35 by four to one
5. Value of a “quick win” likely exceeds cost of KM program
6. Because NASA told us to...



# Approaches to Strategic Planning

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- **Value:** A strategic plan provides focus and elicits consensus for the institutional KM program

Deliberate KM Strategy <sup>1</sup>	Emergent KM Strategy <sup>1</sup>
<ul style="list-style-type: none"><li>• The enterprise's KM strategy requires deliberate and systematic efforts. KM practices, tools and methods are imposed top-down based on a rationale analysis of needs, resources, and objectives.</li><li>• Suited to larger companies with substantial KM resources?</li></ul>	<ul style="list-style-type: none"><li>• The enterprise's KM strategy is not completely planned and deliberated in advance. Methods and tools are adopted where found to be effective and found to be compatible with business practices.</li><li>• Suited to small companies with very limited KM program resources?</li></ul>
<b>JPL Experience</b>	
<ul style="list-style-type: none"><li>• JPL ended up with both. You need a formal plan, but emergent/unanticipated KM needs bubbled up, driving valuable opportunities that couldn't be ignored</li></ul>	

<sup>1</sup>Ettore Bolisani, Enrico Scarso, and Malgorzata Zieba, "Emergent Versus Deliberate Knowledge Management Strategy: Literature Review and Case Study Analysis," Proceedings of The 16th European Conference on Knowledge Management, University of Udine, (Italy) September 3-4, 2015.



# “Quick Wins”

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- Opportunities driven by emerging needs (i.e., “emergent”) may produce quick wins that overshadow results from planned (i.e., “deliberate”) activities. Recent examples:
  - **Open Access Initiative.** Access to a JPL project library by non-project JPL staff is often blocked by the PM. The JPL CKO and CIO are teamed to change this practice.
  - **Daily Mars Surface Ops Planning.** Assisting Mars Operations in reducing the 9 hours required to plan a “sol” of Curiosity rover activity
  - **Phase D-to-A Roundtable.** Helping spacecraft operators communicate operations constraints to spacecraft developers to encourage greater automation of mission operations





# Institutionalizing & Sustaining KM

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- **Place CKO within the product organization, not the IT organization** (i.e., for JPL = Office of the Chief Engineer)
- Prepare JPL KM strategic plan
  - Identify (1) what knowledge is critical, (2) gaps in capturing/retaining/sharing it, (3) activities needed to address gaps
- Recognize pre-existing “KM-ish” activities
- Baseline industry best practices (including NASA’s)
- Obtain buy-in and publicize JPL KM program
  - Both leadership & grass roots (e.g., via semi-annual KM newsletter, “quick win” achievements, OCKO website)
- Effect cultural change and close knowledge retention gaps
- Metrics: track valid measures of KM program maturity



# Close Gaps in Knowledge Capture/Retention

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- **Deliberate approach.** Examples of specific KM activities to close knowledge capture/retention/sharing gaps:
  - Continue JPL's robust lessons learned process (Lessons Learned Committee has met weekly since 1984)
  - Improved access to archived technical knowledge
    - e.g., create Entry, Descent, And Landing Repository (EDL-R)
  - Pause & Learn sessions for project managers
  - Lunch & Learn sessions for project system engineers
  - Mentoring and apprenticeship (e.g., Phaeton program)
  - Increased JPL employee participation in *JPL Wired* wiki
  - *Elastic Search* enables search across multiple repositories
  - *JPL Tube* tool for video capture & transcription of tacit knowledge
- CKO serves mainly as a champion and a facilitator of KM