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# Application of Knowledge Management

Pressing Questions and  
Practical Answers

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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company,  
for the United States Department of Energy under contract DE-AC04-94AL85000.



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## What is Knowledge Management?

- ❖ Finding ways to create, identify, capture, and distribute organizational knowledge to the people who need it.
- ❖ To help information and knowledge flow to the right people at the right time so they can act more efficiently and effectively.
- ❖ Recognizing, documenting and distributing *explicit* and *tacit* knowledge in order to improve organizational performance.
- ❖ A systematic approach to find, understand and use knowledge to create value.

***Finding ways to identify critical information and knowledge, both explicit and tacit, and making it flow to the people who need it, so they can perform more effectively and efficiently.***

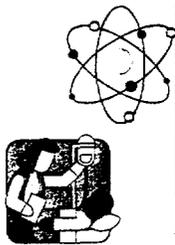
*Explicit* knowledge is quantifiable and definable. It makes up reports, manuals, instructional materials, etc.

*Tacit* knowledge is doing and performing. It is a combination of experience, hunches, intuition, emotions, and beliefs.



## What is Sandia National Laboratories

- ❖ Z Division of Los Alamos National Laboratory.
  - Born out of America's World War II atomic bomb development effort.
  - Manhattan Project - Trinity Test: July 1945.
- ❖ November 1, 1949 became a separate laboratory.
  - Original Mission: To provide engineering design for all non-nuclear components of the nation's nuclear weapons.
  - Today: Sandia performs a wide variety of national security R&D work and provides scientific and engineering solutions to environmental issues and emerging national challenges.
- ❖ Main facilities in New Mexico and California.
  - Smaller sites scattered around the United States.
  - About 8,000 employees.



### Other areas of achievement:

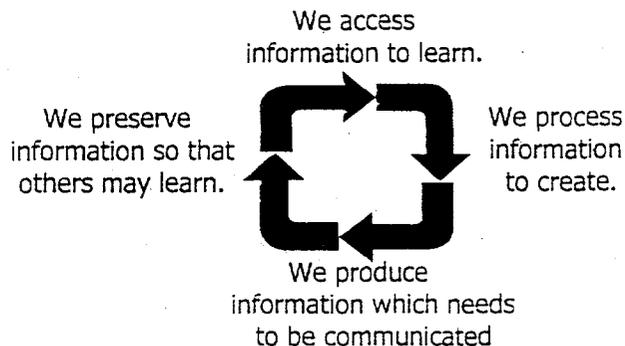
Electronic & microelectronic devices  
Advanced experimental satellites  
New energy sources, use efficiency  
New medical instruments and materials  
Environmentally conscious manufacturing



### The "Pull" of Knowledge Management at Sandia

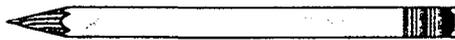
#### The Information Cycle:

Vital to Advance Technology - Vital to Sandia's Mission



#### The Issues:

- ❖ Graying of the workforce - experts retire - separation incentives.
- ❖ Reduced budgets – fewer new hires – less "OJT" opportunity.
- ❖ Pressure to maintain design and development expertise.  
Replacing limited life components - no complete system design work.
- ❖ Pressure to maintain a safe, secure stockpile.
- ❖ Inadequate records management (retention & access of data.)  
Lost or destroyed - obsolete electronic equipment.
- ❖ Inadequate sharing of "tacit" knowledge (individual knowledge transfer.)  
Transferring the "know-how" and "know-why."



**Group Sharing: WHY are other companies implementing KM?**

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**Two Dimensions of Knowledge Management**  
(The "Hows")

**Connecting** = linking people who know, with people who need to know.

- ❖ Communities of Practice: Based on common interests or experience; Ideas, efforts, solutions, and lessons learned are shared. Can be formal or informal.
- ❖ Coaching and Mentoring: Formal mentoring/coaching programs are designed to achieve both corporate training needs and individual career goals.
- ❖ Physical Structure: Learning Centers; corporate libraries; meeting rooms and gathering rooms; Team space, e.g., "the Sandbox", "War Room".
- ❖ Help Desks
- ❖ Advisory Services made up of teams of experts to whom one can call to obtain specific know how or help solving a problem.
- ❖ Who's Who Directory indicating who knows what (Corporate Yellow Pages.)
- ❖ Alliances and partnerships (often are extensions of communities of practice.)
- ❖ Benchmarking & Best Practices activities.

**Collecting** = capturing and disseminating data/information via communication technologies.

- ❖ Provide computer based performance support systems (tools) and job aids.
- ❖ Databases, Groupware.
- ❖ Corporate Intranet.
- ❖ Video Conferencing.

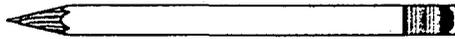
## Elements of Successful Knowledge Sharing

- ❖ *Linked to organizational goals and objectives.*
  - Product to Market Excellence: Strategy is to apply shared learning to product development for a better product and shorter time to market.
  - Customer Focus: Strategy is to market, sell, and service customers more efficiently and effectively by sharing knowledge about customer needs, behaviors, etc.
  - Operational Excellence: Strategy is to share concepts between locations to eliminate mediocrity, create savings and achieve process improvement and production capacity.
- ❖ Linked to organizational rewards system.
- ❖ Clear understanding of what knowledge needs to be shared.
- ❖ Culture for knowledge sharing:
  - Learn before doing: Find the best way it has been done so far.
  - Learn while doing: Adapt the learning to the task at hand.
  - Learn after doing: Determine what you learned & capture it.

## Barriers to Successful Knowledge Sharing

- ❖ Appearance that you might be wasting time if you're standing around talking.
- ❖ Asking for help may indicate that you can't do the job yourself.
- ❖ Timing is not right for sharing: If you don't need the information right away it may be meaningless or forgotten when needed.
- ❖ Takes too long to figure out where to get what you need.
- ❖ Takes too long to go through useless data to find what you need.
- ❖ No rewards
- ❖ Don't know who to get what you need from.
- ❖ Too busy.
- ❖ Information is power syndrome.





**Group Sharing:** What steps can organizations take to overcome these barriers? \_\_\_\_\_

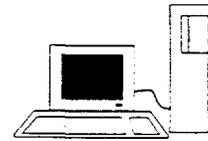
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## Knowledge Management At Sandia



Retiree Corps (Approx 250 people): Use of contracts to have ready access to retired scientists and engineers who have unique skills or knowledge. Participation is in current projects, project reviews, analyzing stockpile issues, mentoring and teaching.

Weapons Intern Program: A 2 year training program: Classes, seminars, engineering projects, research, site visits, rotational assignments, mentoring. Includes Sandia, Production Agency, DOE, Military participants.

Knowledge Preservation: Videotaping interviews with panels of experts. Applying "metadata," digitalizing, storing.

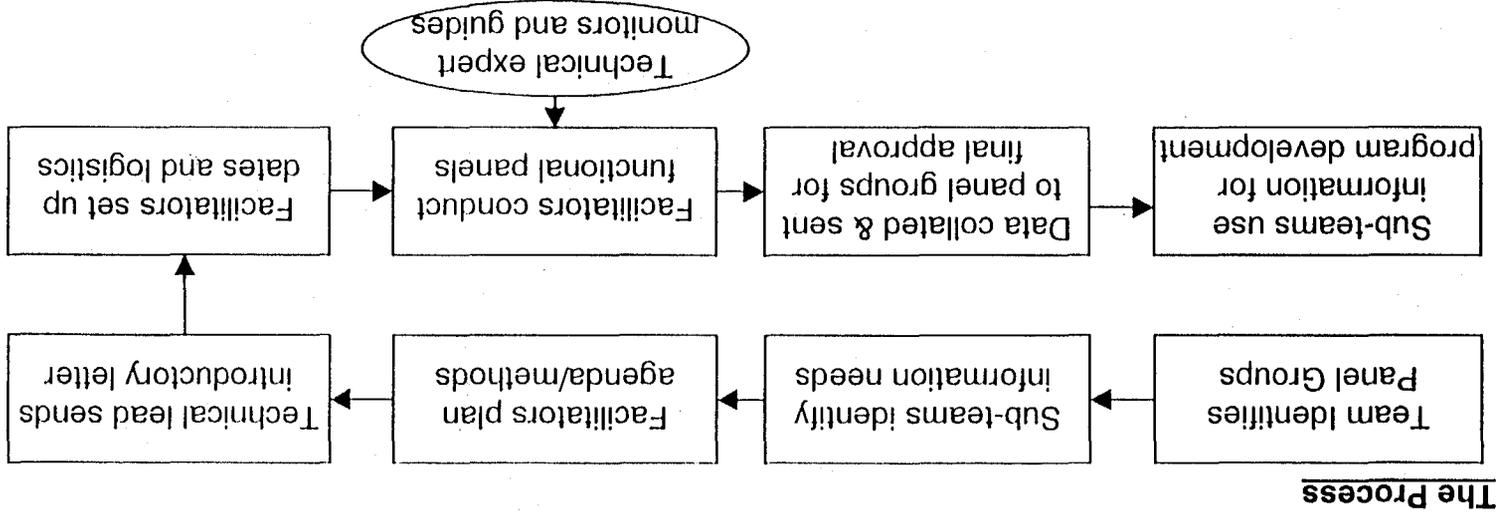
### Data Bases

- ❖ Weapons Encyclopedia: A restricted access database including a breakdown of weapons systems, subsystems, components, and parts.
- ❖ Web File Share: An easy to manage electronic file storage system allows which allows each "business unit" to input, store, access, share, retrieve, and archive files. Utilizes all formats (HTML, JPEG, MPEG, RTF, VHS, ASCII, Word, Powerpoint, Excel, Access, etc.) and all media (memos, documents, audio, images, drawings, ex-rays, microfilm, maps, vugraphs, etc.)

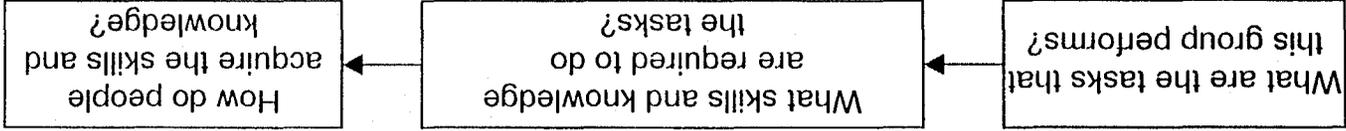
Communities of Practices: Encouraged throughout the labs. A "Communities of Practice" Web Site is under development.

Also Under Development: A Qualification Program for Weaponers

# FUNCTIONAL PANEL PROCESS



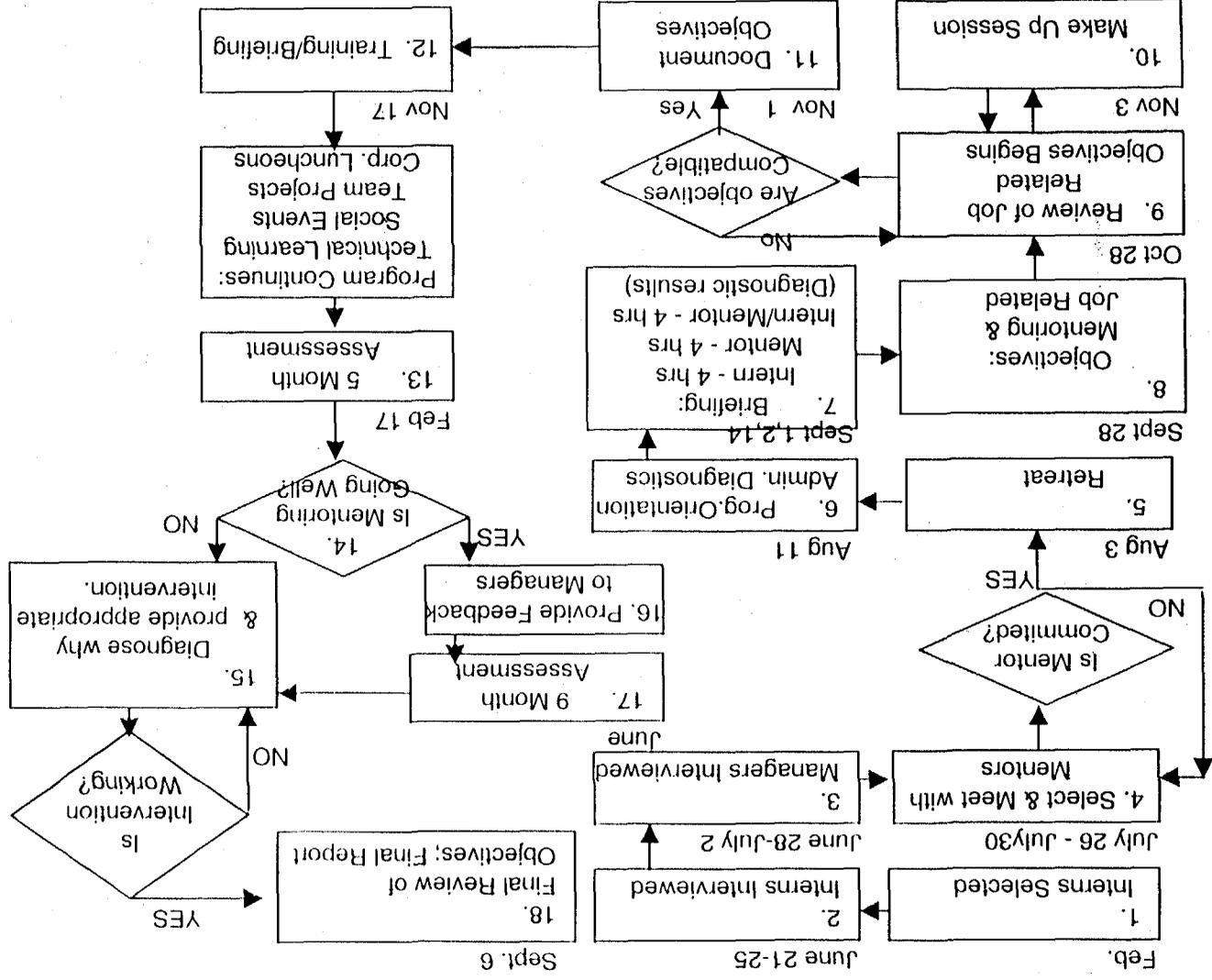
## Skills Competency Information



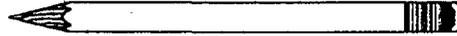
## Data Use and Accessibility

- 1- What externally created data do you use?
- 2- What data do you create internally?
- 3- Who uses your data besides your group?
- 4- What format is the data stored in?
- 5- Where is the data kept?
- 6- Who is responsible for maintaining the data?
- 7- Are there special issues/problems related to Accessing the data/information?

# Weapons Intern Mentoring Program\*



\* Designed in conjunction with LINCO's Amigos™ Program.



**Group Sharing: WHAT are other organizations doing to implement knowledge management?**

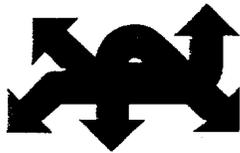
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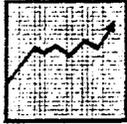
### **The Complex and Intertwined Competencies to Manage Knowledge**

#### At the Individual Level

- ❖ Open to self-learning.
- ❖ Demonstrates reflection.
- ❖ Takes appropriate risks.
- ❖ Learns by mistakes.
- ❖ Generates new knowledge.
- ❖ Accesses knowledge from many sources – internal and external.
- ❖ Embeds knowledge in processes, products, and services.
- ❖ Transfers existing knowledge around the organization.
- ❖ Uses accessible knowledge in decision making and problem solving.

#### At the Corporate Level

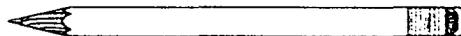
- ❖ Maintains a long-term perspective.
- ❖ Promotes personal and professional learning.
- ❖ Invests in training activities for staff.
- ❖ Values knowledge and encourages communities of interest.
- ❖ Maintains knowledge management systems.
- ❖ Facilitates knowledge growth through culture and incentives.
- ❖ Measures the value of knowledge assets and knowledge management.
- ❖ Uses intellectual capital for competitive advantage.
- ❖ Applies technological innovation for competitive advantage.
- ❖ Helps determine what knowledge is valuable and which is not.



## Measuring Knowledge Management Practices

Five Suggested Measures (Based on the "Knowledge Management Assessment Tool" developed by Arthur Andersen and APQC):

- ❖ Leadership - Does leadership place a high value on knowledge, and use knowledge as a strategy to achieve desired business outcomes? Do employees understand how their skills and competencies contribute to desired business outcomes?
- ❖ Culture - Is there a positive corporate culture of trust? Is knowledge sharing and learning encouraged? Is there a focus on solving customers' problems? Is risk taking encouraged?
- ❖ Technology - Is technology used to provide just-in-time interface with customers and suppliers? Is it used to create a corporate memory?
- ❖ Measurement - Is knowledge management linked to financial results? Are metrics developed around customers, process improvement, partnerships and alliances, and innovation?
- ❖ Knowledge Management Process - Is a process in place to identify gaps in skills and knowledge documentation, and are steps being taken to close those gaps? Are environmental trends (customer, competitors, suppliers) evaluated and strategic changes implemented based on the evaluation? Is there a formal process for sharing best practices?



**Group Sharing: WHAT other indicators could be used as knowledge management metrics?**

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## RESOURCES

O'Dell, Carla; Grayson, C Jackson, Jr.; If Only We Knew What We Know; The Free Press, NY; 1998

Davenport, Thomas H.; Prusak, Laurence; Working Knowledge; Harvard Business School Press, MA, 1998

"The Knowledge Management Assessment Tool" (KMAT); Developed by Arthur Anderson and The American Productivity & Quality Center (APQC)

Arthur Anderson

69 W. Washington St., A28B  
Chicago, IL 60602

APQC

123 North Post Oak Lane  
Houston, Tx 77024

"Knowledge Management", ASTD Infoline, March 1999, Issue 9903  
Articles in several recent issues of "Training and Development" Magazine.

Connections (A list of Knowledge Management web-sites)  
<http://www.webcom.com/quantera/connect.html>

Knowledge Management Exchange:  
<http://www.uky.edu/BusinessEconomics/dssakba/kmexch.htm>

Knowledge Management Think Tank:  
<http://www.brint.com/wwwboard/wwwboard.html>

Harvard Business School Ideas at Work:  
<http://www.hbsp.harvard.edu/ideasatwork/hansen.html#iv4i5-216-idea216>



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