Agenda

Knowledge Management …

• Background
• Tools & Tactics
• Northrop Grumman Case Study
• Current Topics
• Resources
As a participant, what are your objectives for this workshop?

Please do not turn the page.
Knowledge Management

Background
Knowledge Management - Definitions

The leveraging of an organization's collective wisdom to Increase innovation and responsiveness.

ACS Definition

A collection of processes that govern the creation, dissemination, and use of knowledge.

APQC
What is Knowledge?

Knowledge includes:
- Context
- Judgement
- Intuition

It is comprised of:
- Information: data in context
- Data: facts, concepts, instructions
- Metadata: data about data
The 4 Modes of Knowledge Transfer

Tacit to Tacit

Explicit to Tacit

Explicit to Explicit

Tacit to Explicit

e.g., Collaboration and Storytelling

e.g., Learning

e.g., Portals, Web Publishing

Adapted from *The Knowledge Creating Company* by Ikujiro Nonaka and Hirotaka Takeuchi (1996)

Ref: IBM
What is Knowledge Capital?

(Intellectual Capital)

- **Human Capital**
  - Expertise, experience, creativity, insight
  - Includes values, culture and philosophy
  - Cannot be owned by the organization

- **Social Capital**
  - Personal networking and relationships
  - Interrelated system of people or contacts

- **Structural Capital**
  - Organization-owned digitized knowledge
  - Stays if individual leaves

“Enterprise Knowledge”
Benefits of Knowledge Management

Why Others Are Using KM

- **Improving knowledge & information sharing across operating units**: 76% (Aqua), 22% (Maroon)
- **Improving competitive response**: 72% (Aqua), 24% (Maroon)
- **Accelerating the rate of innovation**: 54% (Aqua), 40% (White)
- **Reducing or controlling costs**: 54% (Aqua), 39% (White)
- **Reducing loss of intellectual assets from employee turnover**: 47% (Aqua), 41% (White), 12% (Maroon)
- **Increased need to operate globally**: 46% (Aqua), 35% (White), 19% (Maroon)

*Aqua: rated first; White: second; Maroon: third*

Ref: GartnerGroup
What is the Strategic Value of Knowledge?

“The productivity of knowledge and knowledge workers will not be the only competitive factor in the world economy. It is, however, likely to become the decisive factor, at least for industries in the developed countries.”

*Peter Drucker*

*Harvard Business Review, September - October, 1997*

"Increased economic productivity in the U.S. is due to a combination of intellectual capital, technology and evolving know-how. Most of what we currently perceive as value and wealth is intellectual and impalpable.”

*Alan Greenspan, Sept 1999*
Benefits of Knowledge Management

Intellectual Assets Are Real; Benefits Are Real

- **Support Strategic Direction**
  - Increase Operational Effectiveness
  - Shrink Delivery Times
  - Increase Rate of Innovation
  - Increase Competitive Positioning
  - Shrink Response Time

- **Enterprise Effectiveness**
  - Ease Access to People
  - Increase Span of Experts
  - Learning Organization
  - Increase Collaboration
  - Increase Synergy
  - Learning Organization With an Attitude
  - Work Enrichment

- **Job Effectiveness**
  - Find Information More Quickly
  - Make Better Decisions Faster
  - Gain Insight
  - Reuse Work and Ideas
  - Create

**Tactical Benefits**
- Sharing/Collaboration

**Strategic Benefits**
- Intellectual Asset Leverage

Ref: GartnerGroup
Group Discussion:

In your teams, identify what are the steps required to manage knowledge. Be prepared to present your team’s findings to the rest of the group.
Knowledge Management
Tools & Tactics
Knowledge Management Framework*

*Adopted from the American Productivity & Quality Center, and the National Security Agency

Leadership & Strategy

Use

Leveraging

Create

Adapt

Value

Linking

Share

Capture

Organize

KM Enablers

KM Process

Leadership & Strategy

Management

Share

Capture

Organize

Technology

N

*Adopted from the American Productivity & Quality Center, and the National Security Agency
The 4Ls of Knowledge Management* (KM)

*Adopted from the National Security Agency

• **Leadership**
  – Provide Vision, Strategy, and Resources
  – Define Knowledge That Has Strategic Knowledge
  – Make KM a Part of Everyday Activities

• **Learning**
  – Identify
  – Capture

• **Linking**
  – Organize
  – Share

• **Leveraging**
  – Adapt
  – Use
  – Create
Example: Structures Issue Tracking

- Capturing Knowledge
  - Issues Documented in a Standard Format
  - Indexed to Aircraft Coordinates
- Organizing and Sharing Knowledge
  - Issues Linked to Airframe Web Site
  - Categorized by Root Cause
  - Structured To Speed Information Access
- Re-Using and Adapting Existing Knowledge
  - Provides Essential Data for Lessons Learned, Root Cause Analysis and Training

Beyond-the-Floor Lean Impact: 98% Reduction in Customer Response Time
The 4Ls of KM (Continued)

1. Leadership:
   **Guidance**
   - Identify Key Knowledge Intensive Processes
   - Build Human Capital... Going Beyond Skills Management
   - Identify What Knowledge You Want to Manage
     - No History Books
     - There Must Be Strategic Value

   **Make KM a Part of Work Processes**
   - Provide Leadership Push Until The Knowledge Base Creates Value, and Pull is Established
2. Learning: **Identify**
   - Identify Tacit (Experts) and Explicit (Documents) Knowledge
     - Identify What You Know
   - Identify Communities of Practice
   - Verify Explicit Knowledge Base on Key Processes
     - Interviews
     - Audits
     - Surveys
Community Interactions Create Value

- Sense
  - Discover
  - Capture

- Internalize
  - Understand
  - Create New Knowledge

- Responsiveness
  - Innovation
  - Competency
  - Efficiency

- Organize
  - Categorize
  - Personalize

- Socialize
  - Collaborate
  - Share

Ref: IBM
Tacit Knowledge Resides in Communities

Communities are made up of people, places and things

People
The awareness of others (colleagues, experts, customers, friends, etc.) who are available for conversations.

Places
The places that people interact to collaborate, share ideas, ask questions, find answers and form communities.

Things
The structured and unstructured content that people create, capture, classify and share.

• Communities of Practice are an Emerging New Organization Form
  – Boundary Spanning
  – A Channel for Knowledge Flow
  – Strengthens Social Networks
  – Informal

Ref: IBM and APQC
Communities of Practice and IT Solutions

Dialog
Questions, Problems, Ideas, Debate, Solutions

Knowledge Portal

Web
Bulletin Boards
Documents
Workflow
Software
Data Management System
Project Archive
Expertise Directory
Best Practices
News
Help Desk
FAQs
Email

Learning
New Products & Services

Ref: Schlumberger
Understanding the Situation

Group Discussion:

In your teams, identify examples of where a lack of focused knowledge management has hurt your company. Your team may choose to identify a well-known case outside of your individual companies. Be prepared to present.

– What was the case?
– How was a lack of Knowledge Management responsible for the problem?
– Can you identify, in hindsight, remedies for what occurred?
The 4Ls of KM (Continued)

2. Learning: **Capture**
   - Apply KM Tools
     - Document Management
     - Tacit Knowledge Capture
   - Document Existing Processes
   - Establish Systems to Promote the Capture of Knowledge as it is Being Created
     - Key Processes
     - Communities of Practice
   - Establish Systems to Verify That Information is Being Captured and That it is Valid
## Knowledge Management IT Solutions

<table>
<thead>
<tr>
<th>Portals</th>
<th>Personalized, Automated Information Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert Locator</td>
<td>Profiling and Locating Experts Anywhere in the Company</td>
</tr>
<tr>
<td>Knowledge Capture</td>
<td>Retaining Critical Tacit Knowledge</td>
</tr>
<tr>
<td>Media Management</td>
<td>Organizing, Retaining, and Finding Explicit Knowledge</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Providing Synchronous and Asynchronous Communication Solutions</td>
</tr>
</tbody>
</table>
The 4Ls of KM (Continued)

3. Linking: **Organize**
   - Develop a Taxonomy
     - Enables Faster Searching and Browsing Through Topic Hierarchies
     - Keep Taxonomies Simple and Familiar
     - Taxonomies Can be Developed Automatically Using IT Solutions
   - Content Management is Required
The 4Ls of KM (Continued)

3. Linking: **Share**
   - Develop and Nurture Communities of Practice
   - Change the Office Environment
   - Host KM Events
     - Knowledge Fairs
     - Knowledge Sharing Awards
   - Change Management Methods
     - Reward and Recognition Sharing and Reuse
     - Enhance Water Cooler Effects
     - Recognize That Tacit to Tacit is the Most Effective Transfer Mode – Then Nurture it
     - Build Social Networks and Trust
# Why Do People Share Knowledge?

<table>
<thead>
<tr>
<th>Enablers</th>
<th>Impediments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>Fear and Suspicion</td>
</tr>
<tr>
<td>Sharing is Rewarded</td>
<td>Hoarding is Rewarded</td>
</tr>
<tr>
<td>Focus on Customer</td>
<td>Focus on Organization</td>
</tr>
<tr>
<td>Team-based Work</td>
<td>Individual Effort</td>
</tr>
<tr>
<td>Joint Accountability and Reward</td>
<td>Individual Accountability and Reward</td>
</tr>
<tr>
<td>Process Focus</td>
<td>Functional Focus</td>
</tr>
<tr>
<td>Open to Outside Ideas</td>
<td>Not Invented Here</td>
</tr>
<tr>
<td>Time to Share</td>
<td>Too Busy to Share</td>
</tr>
<tr>
<td>Collaborative Work</td>
<td>Internal Competition</td>
</tr>
<tr>
<td>Need-to-Share</td>
<td>Compartmentalization</td>
</tr>
<tr>
<td>Local Decision Making</td>
<td>Command &amp; Control</td>
</tr>
</tbody>
</table>
Knowledge *Shared* is Power

“Knowledge, jealously guarded by an individual, is not power. Quite the opposite, it detracts from the power and effectiveness of the entire organization.”

- ADM Harold W. Gehman, Jr.,
  *CINCUSJFCOM*
The 4Ls of KM (Continued)

4. Leveraging

Adapt, Use
- Use the Knowledge Base to Enable Innovation
  - Avoid Reinventing the Wheel
  - Tap the Power of Communities
Create
- Create New Knowledge, Building on the Existing Knowledge Base
  - Continue the KM Process: Capture, Organize,..
Northrop Grumman
Case Study
Air Combat Systems – Major Sites

- **Palmdale**
  - B-2 Mods / PDM

- **El Segundo**
  - F/A-18C/D & E/F
  - Joint Strike Fighter

- **Hawthorne**
  - Targets
  - F/A-18 Labs

- **San Diego**
  - Global Hawk
  - MALD

- **Hill AFB**
  - B-2 Composites

- **New Town**
  - Cable Harnesses / LRUs

- **Whiteman AFB**
  - Contractor Field Teams
  - Technical Support

- **Tinker AFB**
  - Software Integration
  - Logistics Support
Northrop Grumman Air Combat Systems

- KM is Sponsored by the Business Area Leader
  - Started in 1997 on the B-2 Program
  - Evolved to the ACS Business Area Level in 1999
  - An Internal Goal in the Strategic Plan
  - Supported by a Core Team

ACS Objective:
To Leverage Our Organization's Collective Wisdom to Increase Innovation and Responsiveness
## ACS Business Case & KM Thrusts

<table>
<thead>
<tr>
<th>Current Environment Challenges</th>
<th>Knowledge Management (KM) Thrusts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Applying Our Tacit Knowledge Competitive Advantage</td>
<td></td>
</tr>
<tr>
<td>– Maintaining Leadership</td>
<td>• People Thrust</td>
</tr>
<tr>
<td>– Increasing Innovation &amp; Responsiveness</td>
<td>– Identifying, Retaining and Linking Experts</td>
</tr>
<tr>
<td>• Integrating New Solutions Across the Company</td>
<td>– Building Communities of Practice</td>
</tr>
<tr>
<td>– Leveraging What We Know</td>
<td>– Enabling Sharing</td>
</tr>
<tr>
<td>– Enabling Collaboration</td>
<td>• Process Thrust</td>
</tr>
<tr>
<td>• Developing New Technology</td>
<td>– Identifying, Building &amp; Transferring Best Practices</td>
</tr>
<tr>
<td>– Re-using Existing Knowledge</td>
<td>– Capturing, Organizing, Linking and Leveraging Existing Knowledge</td>
</tr>
<tr>
<td>– Building the Knowledge Base</td>
<td>• Technology Thrust</td>
</tr>
<tr>
<td>• Managing a Changing Aerospace Industry</td>
<td>– Implement KM Solutions for:</td>
</tr>
<tr>
<td>– Declining Experience Levels</td>
<td>– Portals</td>
</tr>
<tr>
<td>– War on Talent</td>
<td>– Expert Locator</td>
</tr>
<tr>
<td>• Increasing Affordability</td>
<td>– Media Management</td>
</tr>
</tbody>
</table>

N
We Believe That a Declining Experience Level Has Been a Contributing Factor to the Problems We Observe in Many Recent Aircraft Programs.

RAND
Our Customers Recognize the Value

Selected DOD Examples

- Army Knowledge On-Line
- Joint Forces Command Knowledge Today
- Navy Knowledge Based Organization
- Air Force Knowledge Management
“Leveraging The Intellectual Capital Of America’s Army” to Transform the Institutional Army Into an Information-age, Networked Organization

“Paperless Career Field Designation” Pilot
- >90% submissions Via Web Site
- Response Rate: 50% in 4 Weeks Vice 3 Months
- Saved PERSCOM 225 Labor Hours
- More Time for Counseling Members

“Get it right”, “Get ahead”
DoD KM - Navy’s Knowledge-Centric Organization

- “Knowledge-Centric Organization” (KCO) Effort Funded Since 1998
- KM Toolkit
- Navy-Marine Corps Intranet, $5B Investment
- CINCPACFLT “Knowledge Homeport”
  - Link All Ships
  - “Self-serve” Force Structure Information
  - Diminished Stove-Pipes
  - Ultimately Link >250 Databases
Northrop Grumman Air Combat Systems

Knowledge Management Vision

• **Pervasive Process & Product Knowledge Re-Use**
  – To Quickly Solve Challenges and Innovate New Products

• **High Knowledge Worker Productivity**
  – With Cost Savings to Existing Customers and Unmatched New Business Proposals

• **An Enabling Environment**
  – Which Promotes Collaborative Work, Increases Team Effectivity, and Fosters Creative Thinking

• **Extensive Customer Pull for ACS Knowledge**
  – Delivering High Value with High Customer Satisfaction

• **Growth in ACS Knowledge Capital**
  – Resulting in Superior Products and Higher Company Value
2001 Northrop Grumman KM Projects

Portal
- Reduces time searching for internal & external information
- Enables smarter decisions
- Enables communities

Document Management
- Provides needed resources and support for the implementation of a common Explicit Knowledge Base

Workplace Environment (Modern Offices)
- Increases collaboration, communication, productivity, space utilization and employee morale
- Leverages proven modern office designs and technology

Best Practices
- Improves capture rates
- Provides new programs with best practices as the starting foundation

Targeted KM Projects
- Applies KM practices and tools to ACS challenges
- Demonstrates KM value
- Builds peer-to-peer testimony

Core Team
- Provides Strategy, Plans, Project Management and Supporting Resources
- Acts as KM champion providing communication and awareness across ACS

Communities of Practice
- Leverages the collective wisdom of the enterprise
- Creates and Sustains strong people to people networks

Rewards and Recognition
- Reinforces the value of knowledge
- Creates desired behavior in knowledge sharing and reuse

Tacit Knowledge Capture
- Provides a quick start for new work
- Reduces re-invention, re-work, and duplication
Example: Materials and Processes Project

Mike Garcia, a KM Project Manager was faced with a significant challenge as a major military aircraft program was downsized. How to ensure that all of the tacit knowledge accumulated on the program did not disappear with the changes affecting Northrop Grumman.

Mike’s team organized and conducted a very successful KM capture project. The steps listed below are what happened or what Mikes feels should have happened in retrospect.

1. Talk to the leadership team and identify the strategic knowledge that needs to be captured
   ▪ Get the leadership team on board and involved in terms of identifying priorities
   ▪ Put bounds around what needs to be captured
   ▪ Find a sponsor with funding
2. Educate people on the benefits of KM
   ▪ Overcome the fear factor – emphasize the social network
   ▪ Strive to make KM a part of daily activities
3. Prepare to capture knowledge:
   ▪ Identify the knowledge intensive subject areas
   ▪ Identify experts (not degree driven, driven by knowledge)
   ▪ Ask experts to identify other experts
   ▪ Have the experts develop shopping lists of knowledge
4. Capture, organize and link knowledge
   ▪ Select core team (enthusiasm and technical proficiency)
   ▪ Apply KM tools – capture, organize, and link the knowledge
Example: Materials & Processes Project

- M&P “Portal”
  - Single Point of Knowledge
  - Links Both Tacit and Explicit Resources
- Initiated in 2000
  - Applied KM IT Tools
  - Identified, Captured, Organized & Linked Documents
- Captured Key Documents
  - 5,000 Documents From 12+ Different Sources
  - Key M&P Processes
  - 100,000+ Test Records and Materiel Qualification Files
Materials & Processes Project

Knowledge Captured = High Strategic Value

• Hot Structures
  – Exhaust, Hot Surfaces, Ceramic Tile

• Special Coatings
  – Both the Materials Attributes and the Processing Parameters
  – Coating History, Repair Features and Design Considerations

• Composite Materials
  – Including Honeycomb Core, Epoxy and Polyimide Laminates

• Processes & Programs
  – Shop Floor Liaison & Specification Release
Materials & Processes Project

Documents

- Data & Documents Captured:
  - 1348 Lines of Specification Test Methodology Data
  - 3047 Records of Material Shelf Life Data
  - 160 RAA Requirements Documents
  - 729 Lines of Supplier Data
  - 3269 Lines of Material Data
  - 1500 M&P Specifications

Livelink Solution
- Intranet - Browser Accessible
- Simple to Use (Folder Views)
- Document Management
  - Configuration Control
  - Access Control
  - Content Searchable
  - Single Point Retention
  - Team Enabler
Materials & Processes Project

Processes

Examples of Processes Captured and Linked On-Line

Hyperknowledge Model of the M&P Specification Release Process

Test Specification for Paints

Test Specification for Caulks
Materials & Processes Project
Tacit Knowledge

Materials & Processes Video

Title: Composite Structures - Donna Guritz 6-01-2000

Outline of Composite Structures Video

- Introduction
  - Northrop Grumman employee Donna Guritz provides knowledge pertaining to composite structures
- 1.0 Honeycomb Core
- 2.0 Making the Honeycomb Core
  - This video clip depicts .........................
- 3.0 Skin Fabrication & Material
- 4.0 Laminate Processing
- 5.0 Adhesive Materials
- 6.0 Bonding Problems

To Obtain Complete Video CDs See Patty Jones or Email: N_tacit_knowledge@nwo.de
Knowledge Management
Current Topics
KM Current Topics

- Space
- Collaboration
  - c-Commerce
- e-Learning
- Social Capital
  - Networks and Trust
The Impact of Space

Work Has Changed, But the Workplace (Typically) Has Not

1979
- Repetitive Process
- Functional
- Individual
- Doing
- Work As a “Place”
- Manual

2000
- Knowledge Work
- Product Teams
- Team
- Learning
- Work Anywhere
- Technology

Ref: Steelcase
Beyond the Cubicle

- Office Space Directly Impacts How People Work
- Modernizing Office Spaces Can Improve...
  - Knowledge Sharing
  - Social Networks and Trust
  - Team Productivity
  - Collaboration, Communication
  - Space Utilization
  - Employee Satisfaction

Owens Corning Example
Reasons for Typical Cube Designs

- One Size Fits All
- Standards Based on Title
- Little Support for Teams
- Discourage Interaction
- No Mobility…Assumed All Work Is the Same
- Focus: Efficiency… Not Effectiveness

Ref: Steelcase
A Transformation Example at Northrop Grumman

- 300% Increase in Shared Space
- 25% Decrease in Private Space

“I have a better idea of their daily routines, work habits and work hours. I think the team bonding has increased and I get more glimpses into their personal lives.”

“Now I’m aware of how much the team leaders have to coordinate with others”

“Team members do communicate more with more informal meetings taking place”

“Manager more involved in team operations” (Manager moved from a wall office to the floor)
Providing Collaborative Workplaces

INFORMAL MEETINGS & COMMUNICATION, SPREAD SPACE, VISUAL ACCESS

WORK FLOW - SPREADING, MOBILITY, INFORMATION PERSISTENCE
The Northrop Grumman KM Team Space

1. TEAM ENVIRONMENT WITH HIGH VISIBILITY

2. EMPHASIS ON INFORMATION PERSISTENCE

3. CONDUCIVE TO INFORMAL MEETINGS
Workstation Designs: By Work Type
What is Collaboration?

“To work together, especially in a joint intellectual effort”

• Work: “Activity Directed Toward the Accomplishment of Something”
• Joint: “Characterized by United Action”
• Intellectual: “Capacity for Understanding” (Knowledge)
• Effort: “Exertion of the Will”

* The American Heritage Dictionary
What is c-Commerce?

“the Electronically Based Collaborative Interactions Among an Enterprise and its Partners, Suppliers, Customers, and Employees”

Gartner Group

c-Commerce Requires

- Knowledge Management
  - Including Collaboration
- Work Process Management
From Training to e-Learning

........From Training To Learning........

Just In Case ↔ Just In Time
Lead By Instructor ↔ Self-directed Learning
Teachers ↔ Coaches, Mentors, Facilitators
Mostly Classroom ↔ Multiple Delivery
Scheduled (Pushed) ↔ Self-serve (Pulled)
One Size Fits All ↔ Targets Only the Capability Gap
Generic Training Needs Analysis ↔ Targets Only the Capability Gap
Participation Metric ↔ Demonstration of Capability
Delivering Programs As End ↔ Increasing Capability As the End

Prescriptive

Self-initiated
e-Learning is Not CBT
Social Capital – Networks and Trust

• Tacit Knowledge is Created Through Experiences and Shared Through Trust
• Trust Develops Through Networks
  – Usually Not Aligned with Organizations
• How Do We Identify, “Mine” and Nurture These Networks?
• How Does Virtual Work Impact Trust?
• How Does Physical Space Impact Social Networks?

Ref: NetForm, Dr. Karen Stephenson
Knowledge Management
Resources
Knowledge Management Resources

• Books
  – *Working Knowledge*, by Thomas H. Davenport and Laurence Prusak
  – *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*, by Georg Von Krogh, Kazuo Ichijo, and Ikujiro Nonaka
  – *If Only We Knew What We Know*, by Carla O’Dell
  – *E-Learning*, by Marc Rosenberg
  – *Leading Change*, by John Kotter
  – *Fourth Generation R&D*, by William Miller and Langdon Morris
  – *The Tipping Point*, by Malcom Gladwell
Knowledge Management Resources

• Web Sites
  – KM Magazine http://www.kmmag.com
  – KM World http://www.kmworld.com/
  – George Mason University KM Site http://www.icasit.org/km/index.htm
  – Buckman Laboratories http://www.knowledge-nurture.com/
  – American Productivity and Quality Center http://www.apqc.org/
  – @Brint http://www.brint.com/km/
  – And Many Others…. 
Knowledge Management Resources

• Organizations
  – IBM Institute for Knowledge Management (IKM)
  – American Productivity and Quality Center (APQC)
  – The Conference Board, Learning and KM Council
  – Knowledge Management Consortium International (KMCI)

• Scott Shaffar
  – (310) 331-5261
  – shaffsc@mail.northgrum.com