
Retaining and Reusing Knowledge in Shipbuilding

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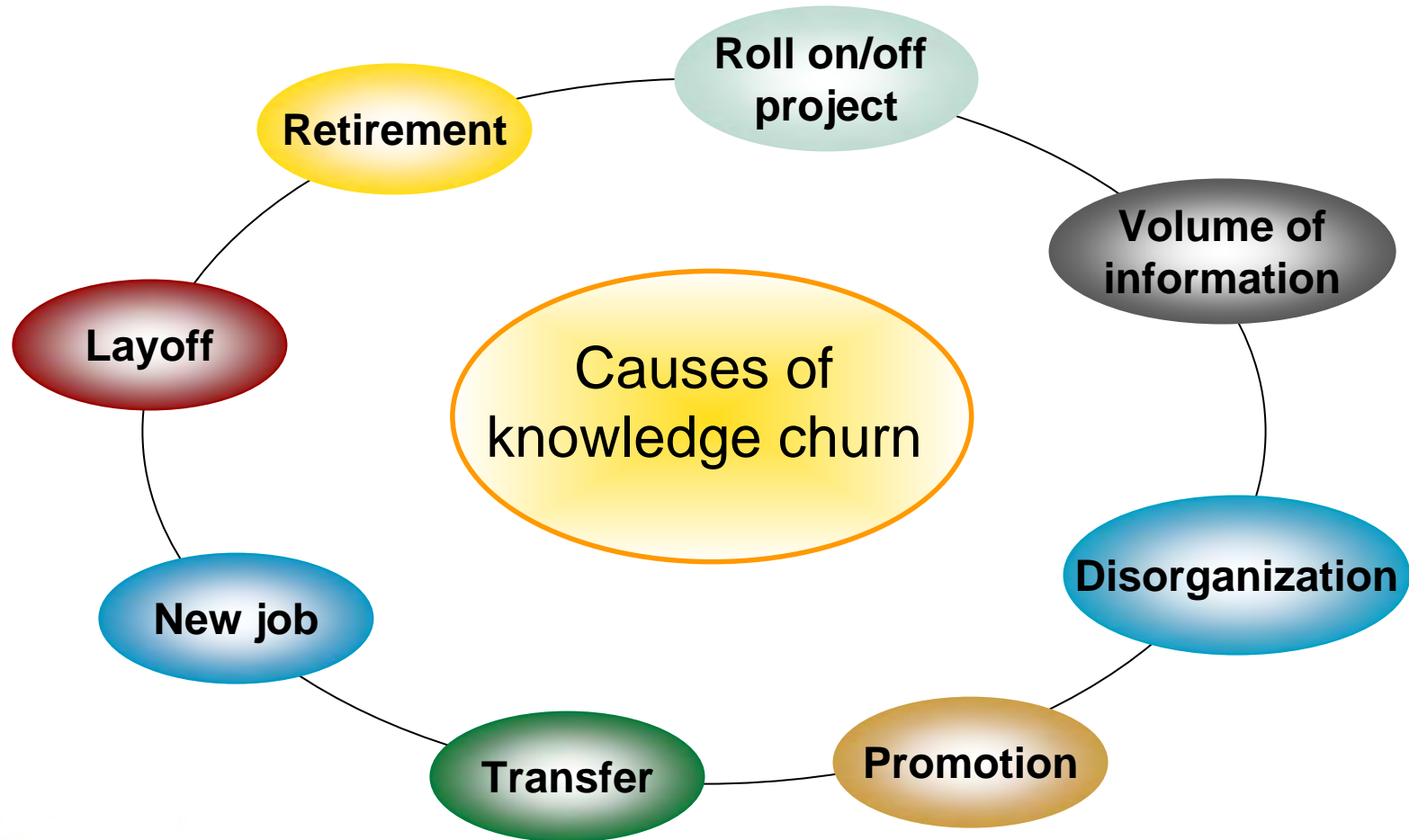


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Leveraging Knowledge

Knowledge Churn

The constant creation, loss, and recreation of knowledge



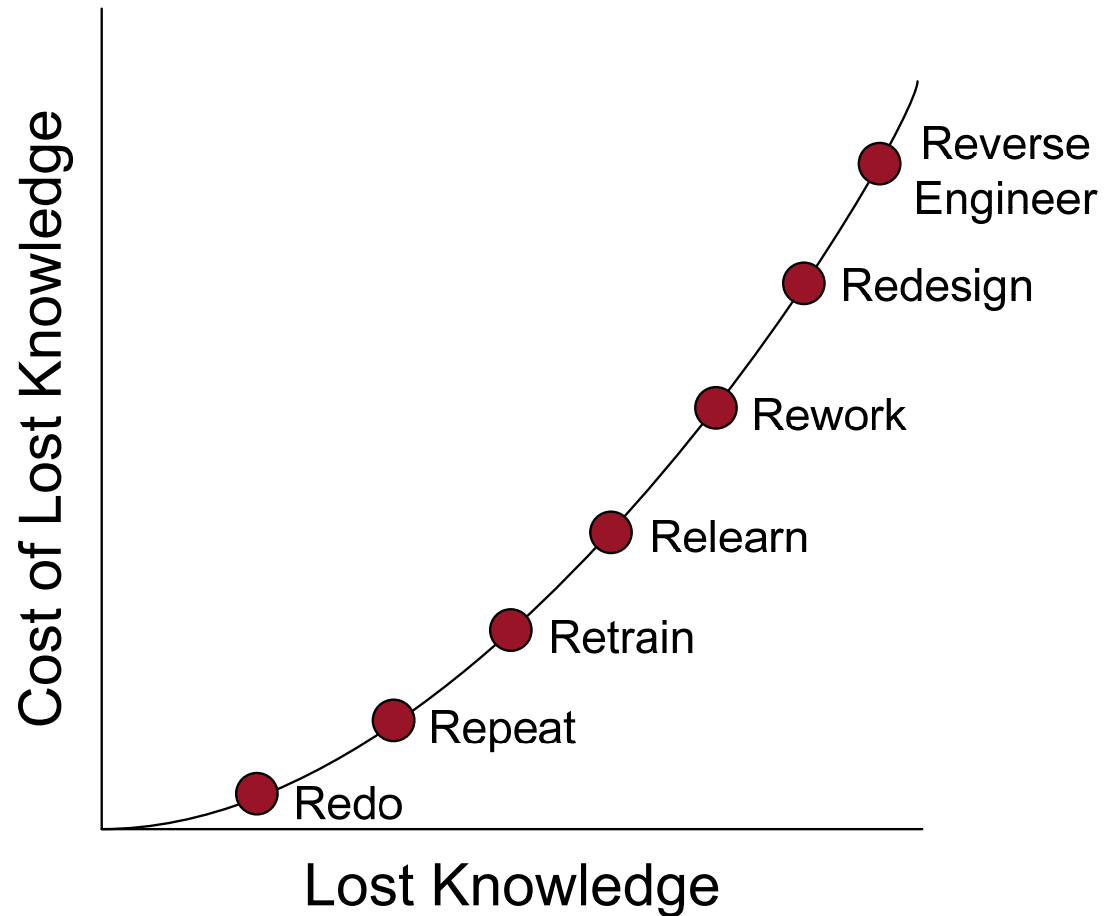
Lost Knowledge

- Data
- Rules
- Documents
- Process execution
- Tools
- Contacts and relationships
- Experience – Know how - Why
- Lessons learned - History



Consequences of Knowledge Churn

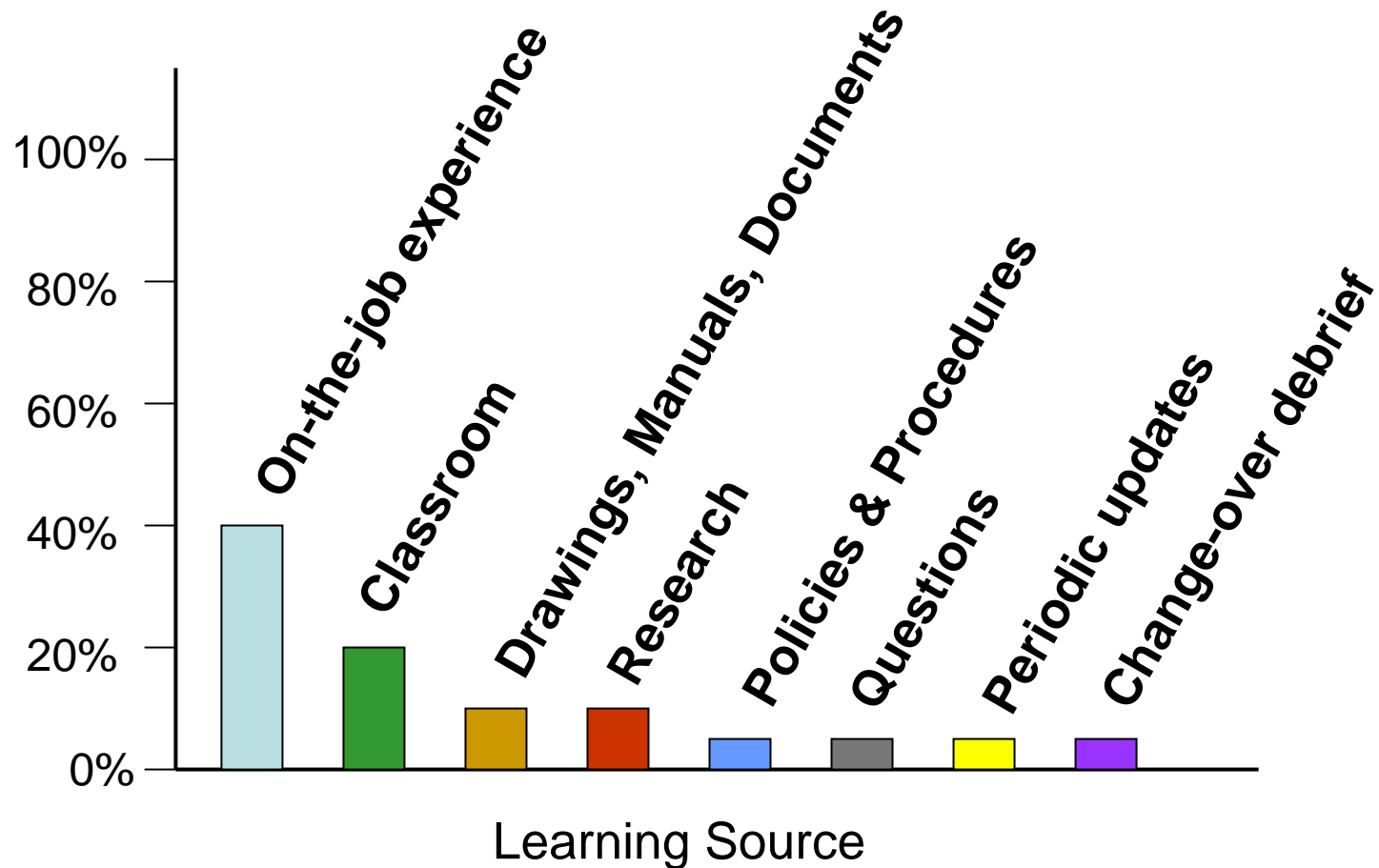
Searching for and recreating lost knowledge = Over **12%** productivity loss annually in US companies



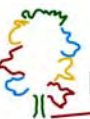
When people leave a project or position, knowledge loss approaches 90%.



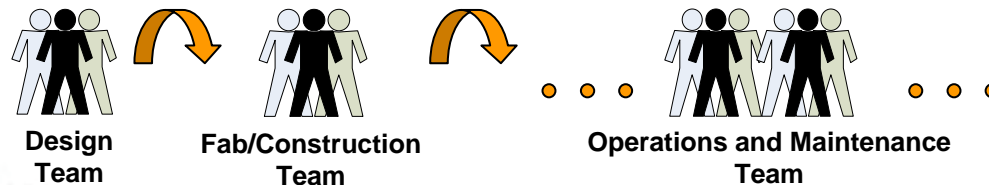
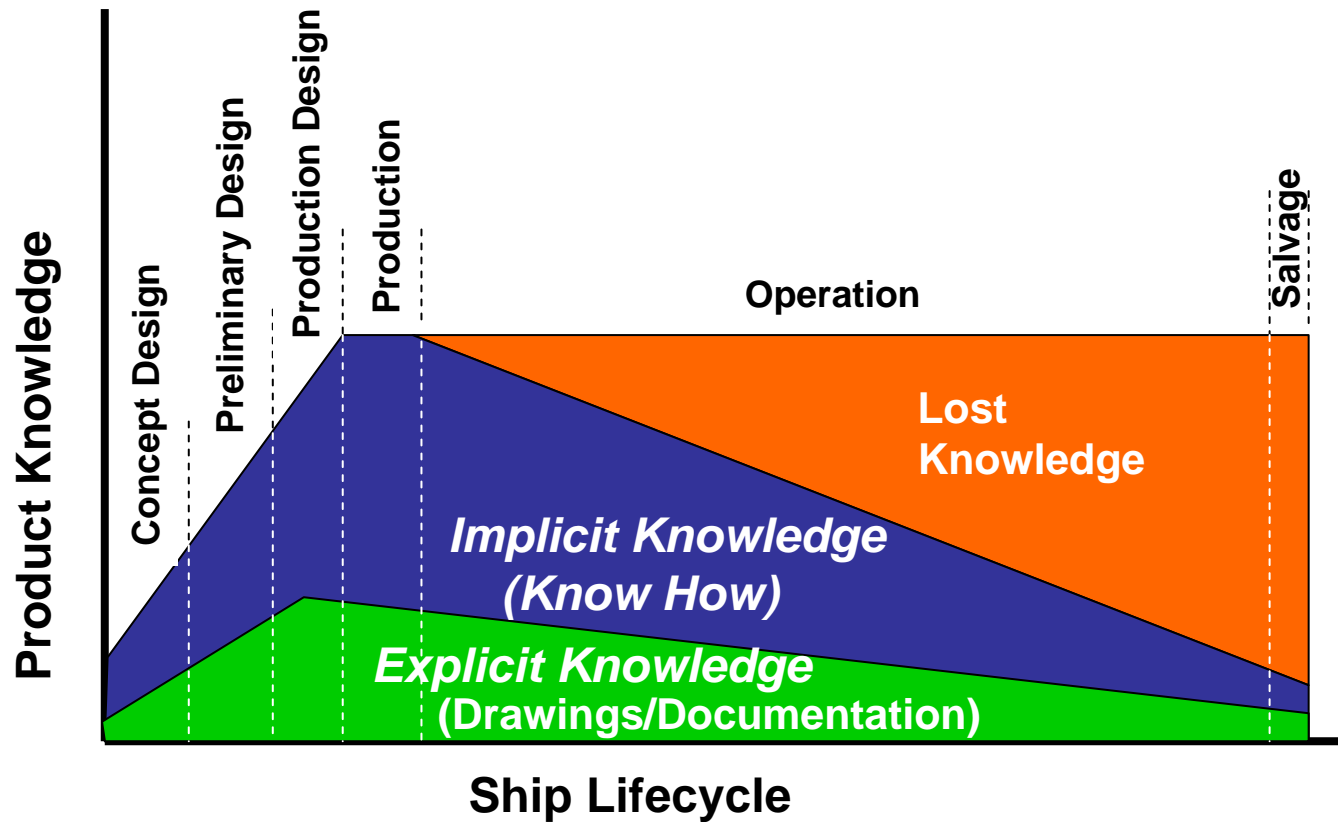
Learning Methods



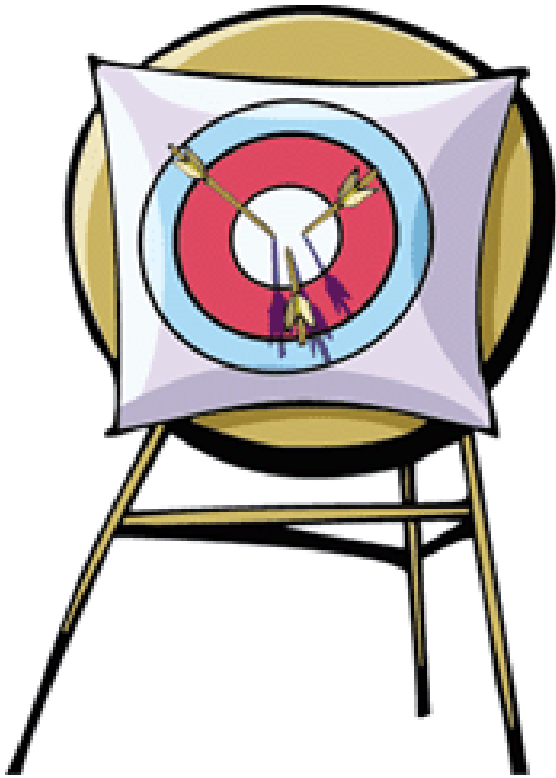
Knowledge workers take 3 – 12 months to come up the learning curve when they start a new job.



Implicit and explicit knowledge



Goals of knowledge management



- Capture knowledge and information for future reference.
- Find knowledge and information quickly.
- **REUSE** knowledge and information instead of recreating them.



Shipbuilding Survey

- 39 total respondents
- Average respondent
 - worked in an engineering-related area of shipbuilding for over 20 years
 - has a technical engineering degree
 - has a masters degree.
- 5 of the respondents are currently in company-line management or project management positions, while the remainder are in technical or technical support positions.



Shipbuilding Survey

- 85% of respondents identified lost knowledge as a serious or very serious problem.
- Problems identified as the most common direct effects of lost knowledge:
 - Lost lessons learned
 - Decreased productivity
 - Increased training and learning curves
 - Repeated mistakes
 - Sub-optimal designs

Shipbuilding Survey Results

- 17% of respondents time is spent recreating knowledge and documents that they know they already have but cannot find (lost documents).
- 33% of their time searching for information that they need to use to complete a given task.

Fully half of what these knowledge workers do is look for and recreate knowledge and information because they can't find it or don't have access to it when they need it.



Shipbuilding Survey

- 77% of knowledge learned was from on-the-job training and experience.
- 46% of OTJ training was self taught.
- 62% of top three tasks were identified as repeatable.

Shipbuilding Survey

Current media used to store knowledge and information

•Drawings	24.7%
•Enterprise documents	22.9%
•Databases	15.0%
•Personal documents	13.8%
•E-mail	13.3%
•In people's head	12.3%
•Spreadsheets	11.1%



Shipbuilding Survey

Most useful knowledge repositories

- Internet
- Enterprise documents
- Databases
- E-mail
- Drawings

Knowledge repository use frequency

- | | |
|------------------------|-----------------|
| • E-mail | Daily |
| • Internet | 3 – 4 x / week |
| • Personal documents | 2 – 3 x / week |
| • Spreadsheets | 2 – 3 x / week |
| • Databases | 2 – 3 x / week |
| • Drawings | 2 – 3 x / month |
| • Enterprise documents | 2 – 3 x / month |



Shipbuilding Survey

- Provide verbal answers in a structured face-to-face interview.
- Jot down your thoughts and send by e-mail to someone else.
- Actively explain to someone what you are doing and thinking while you perform a task.
- Write the knowledge down yourself in a structured environment.
- Gather existing information and send it to someone.

Shipbuilding Survey

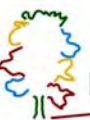
- Unwillingness to change (We've always done it this way ... why change)
- Lack of project budget & schedule
- Lack of common vision between upper management and individual contributors
- Stove-piped departments
- Cost of implementing knowledge management tools
- DOD acquisition policies
- Organizations support competition over collaboration

Analysis

The real cause of the knowledge loss problem is not churn in the workforce.

The real problem is that knowledge and information are not being adequately captured in a format that facilitates reuse.

Knowledge workers are so busy performing project tasks and creating or searching for knowledge needed in the moment that they do not adequately retain what they create or find for future reuse.



Do Something Different

Just doing more of the same doesn't solve the problem of lost knowledge. You have to analyze the problem and **DO SOMETHING DIFFERENT.**



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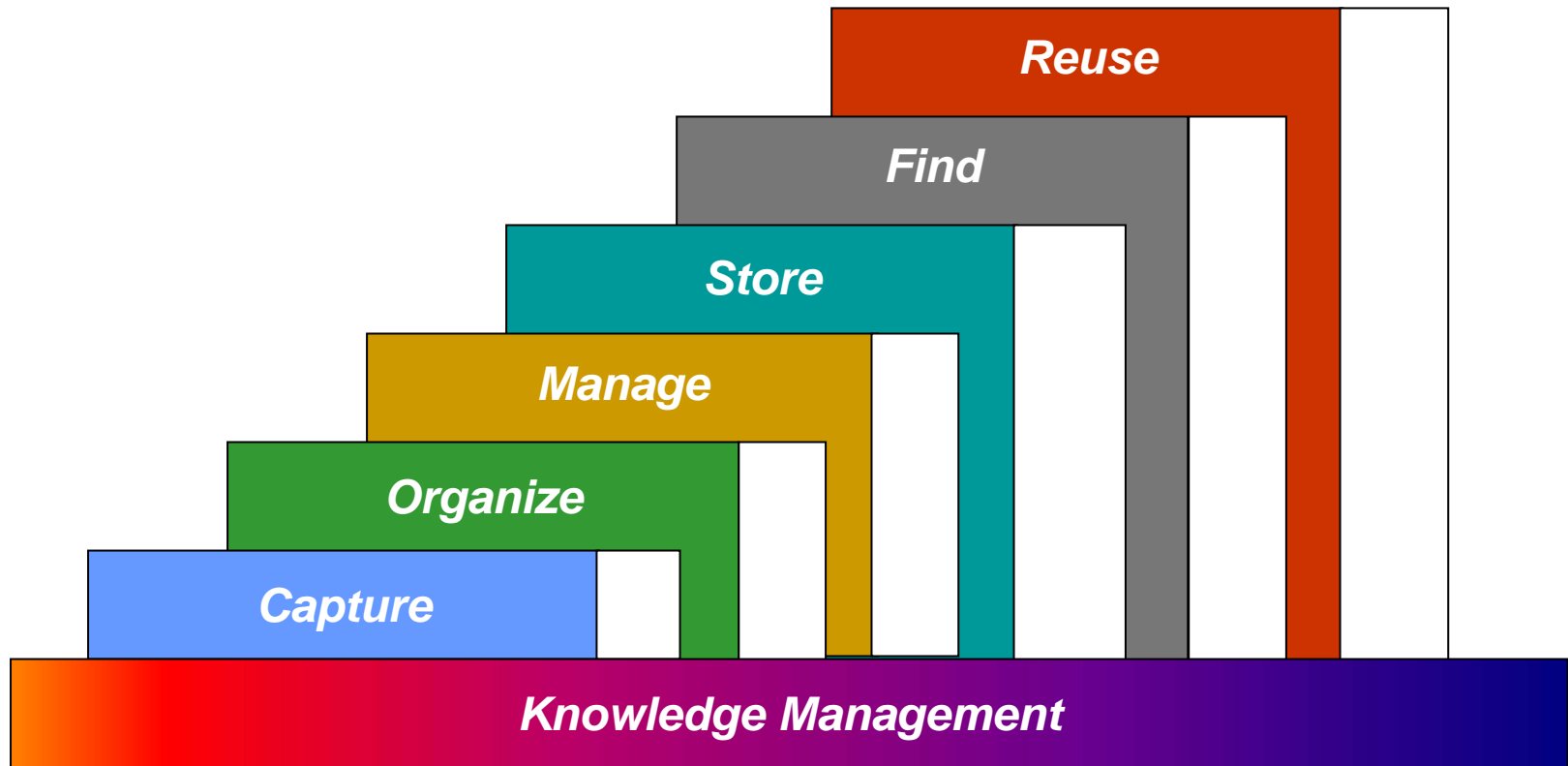
Leveraging Knowledge

Engineered Products

An engineered product approach to shipbuilding that fully captures and reuses knowledge will:

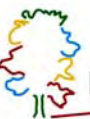
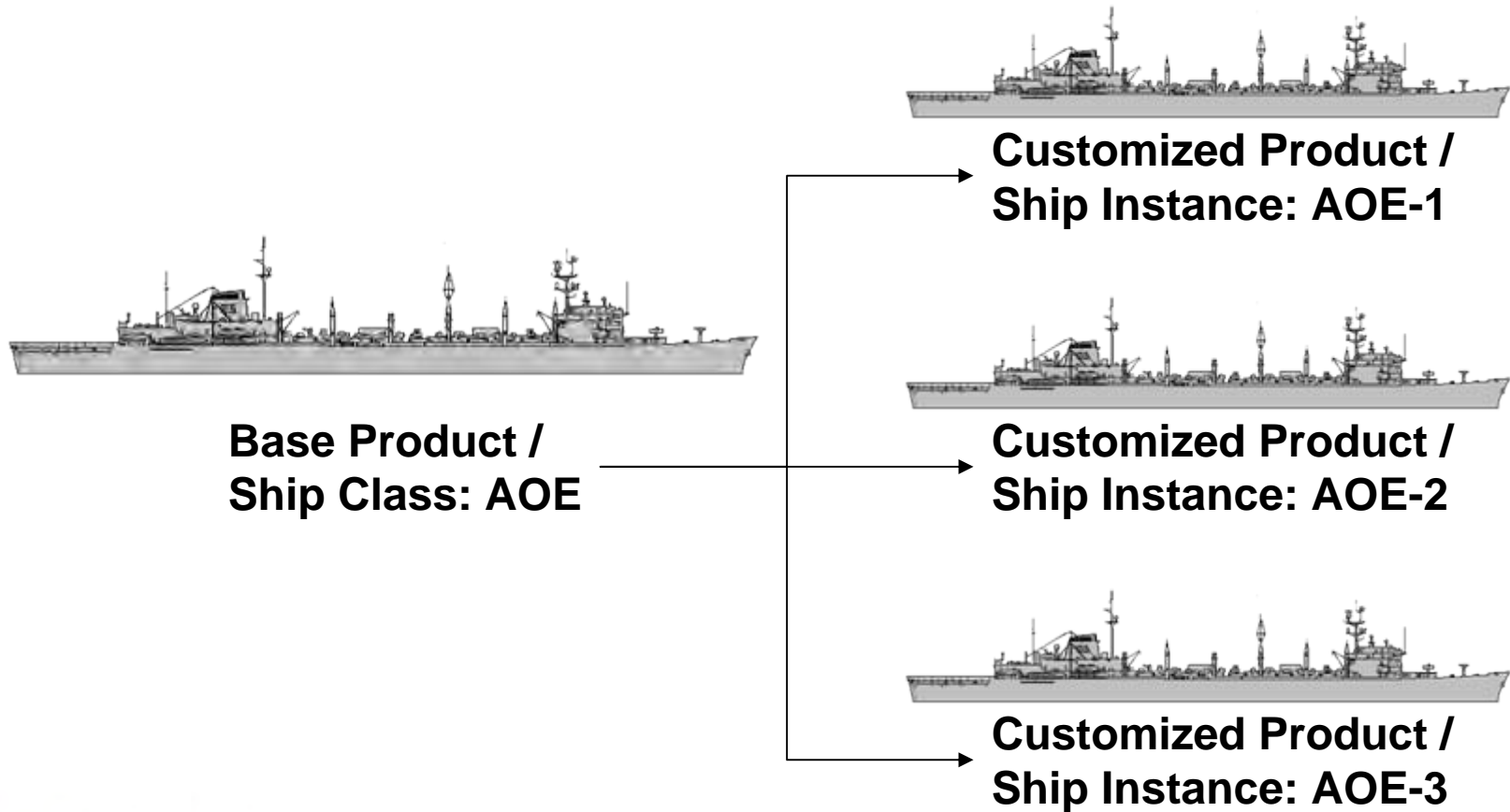
- Emphasize process
- Leverage ship class design
- Implement standards, parameterization, and lessons learned

Knowledge Management Process



Ship Class Design & Delivery

Ships as Engineered Products



Standards



Knowledge Infrastructure

- Usable, rich knowledge repositories
- Methods and tools to dynamically capture and organize useful knowledge
- Methods and tools to quickly find knowledge
- A delivery mechanism to apply captured knowledge to specific customer orders
- Time and money to create the methods and tools
- Supporting organizational alignment



Demonstration

KSS KnowledgeManager & Enhancements