



# Impact of Knowledge Management Tools as Integrating Mechanisms

## *A DD(X) Case Study*

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# DD(X): A Case Study

## *Agenda*

- The DD(X) Enterprise
- The Enterprise Challenge
- The Knowledge Management Solution
- Benefits of KM Quantified
- DD(X) Case Study
- Conclusions



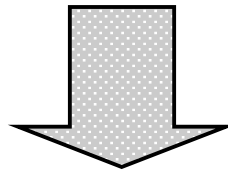


# DD(X) Enterprise

- DD(X) Enterprise: A **complex and diversified** enterprise consisting of:
  - Over 100 public, private and academic organizations
  - Over 5,000 worker stakeholders, located in 35 different states
  - Northrop Grumman Ship Systems awarded lead contractor role with Raytheon Corporation named combat systems integrator
  - Customer stakeholder: U.S. Navy with over 100 military and civilian employees assigned to the program

# DD(X) Enterprise

Customer Stakeholder is challenging the enterprise value stream to develop and procure a “cutting-edge” warship in every aspect imaginable



- Little to no re-use of current DDG-51 Destroyer Program
- Latest technologies to be implemented in all systems, from stem to stern
- Latest technologies to be implemented from first hull number –vice- slow upgrades via “flights”: therefore reducing early obsolescence
- Innovative hull structure and combat systems meant to evolve surface combatants to meet current-day littoral threats



# DD(X) Enterprise

## Enterprise Summary

*The Customer Stakeholder is demanding a historical product from the DD(X) enterprise; A revolutionary warship of significant scope, complexity and diversity that requires the critical mass of intellectual assets and “know how” from over 100 organizations for success.*



# DD(X) Enterprise Knowledge Management Challenge

## ***Challenge:***

How does an enterprise of this scope effectively tie together all stakeholders into one efficient and cohesive team, capable of real-time collaboration and high-velocity work flows?

## ***Answer:***

Investments in KM Collaboration Tools



# The KM Solution

- Starting in 2003, and ending in June 04, the enterprise rolled-out a pair of powerful KM collaboration tools:
  - *Teamcenter Community*<sup>®</sup> & *Teamcenter Enterprise*<sup>®</sup> of the UGS Corporation
  - Capabilities:
    - Network Meetings with “.jt” viewable capabilities
    - Web accessed data vault serving as single, authoritative source of all design documentation
    - Multiple other collaborative capabilities

*Teamcenter Community* & *Teamcenter Enterprise* are registered trademarks of the UGS Corporation.



# The KM Solution

- Enterprise expected qualitative benefits from this significant investment:
  - The linking together of all stakeholders into one cohesive team in order to support *Total Ship System Engineering*: A holistic, broad-based systems engineering and design approach to shipbuilding.
    - TSSE focuses on the ship as a total engineering system to include the hull, machinery, electronics, combat systems and humans.
  - Enabling the real-time sharing of knowledge and information in order to meet demanding customer and end-user needs.





# The KM Solution

*KM Solution applied throughout the entire  
DD(X) Enterprise*

- Both collaboration tools available on any desktop with a web browser
- *Teamcenter Community*<sup>®</sup> available to 100% of DD(X) workers
- KM tools quickly adopted due to worker buy-in and intuitive GUI



# Benefits of KM to the DD(X) Program Quantified

- KM Benefit Data Methodology
- KM Benefit Computations
- KM Benefit Figures
- Benefit Figures Meaning to DD(X)  
Enterprise



# Benefit Data Methodology

- First, essential to identify the “**core**” benefits of the KM tools being used:
  - Reduction in Process Cycle Times
  - Reduction in Process Re-Work Rates
- Identify any “other” significant benefits to the program from the use of the KM tool:
  - Reduced travel expenses
  - Reduction in number of CAD/CAE licenses needed



# Methodology cont'd.

- Determine if program leadership already has appropriate metrics in place for benefit data collection:
  - Metrics that capture process cycle-times before and after the KM tool roll-out
  - Metrics that capture process re-work rates before and after the KM tool roll-out
  - If appropriate metrics are currently in place...simply a computational challenge
- This was not the case for our program of study



# Methodology cont'd.

- In most cases, appropriate metrics are not in place for “easy” data collection of KM “core” benefits
  - Possibly due to most “accounting-centric” metrics currently being used
- Therefore, must go to the most accurate source of KM benefit data available: **“The Process Owner”**
  - Process Owner: The workers using the KM tool to successfully complete their day-to-day processes in the enterprise value stream
  - Strive for a representative sample of the program, process owners across the programs functions



# KM Benefit Computations

- Compute the “**core**” benefits:
  - Calculate the mean reduction in Cycle Time & Rework time for each major segment of your program
    - Convert these benefits to a ‘per month’ unit for business case calculations
  - Extrapolate the “core” benefits appropriately across each segment of the program
  - Convert to dollars using workers *mean hourly rate*
- Compute any other major benefits identified for each segment of the program
  - Again, extrapolate these benefits across each segment of the program



# Building the Business Case

- Since benefit data is based on process-owner estimations, factor in uncertainty ( $\mu, \_$ )
- Based on your benefit data extrapolations, calculate both NPV and ROI:

(-) Initial KM tool capital cost	}	=	<b>NPV</b>
(-) Monthly KM tool recurring costs			
(+) Monthly Cycle-Time Red. Benefit			
(+) Monthly Re-Work Red. Benefit			
(+) Other significant Benefits (i.e. Red. Travel Costs)			
			<b>&amp;</b>
			<b>ROI</b>



# DD(X) KM Benefit Figures

- NGSS realized an estimated **ROI of 2376%** for the 6-month period from KM tool roll-out and adoption (Jun 04') to data collection (Jan 05').
- Also, an estimated **ROI of 3469%** for the 18-month period of June 04' to December 05'.
- These benefits are a direct result of the capital investments made in the KM tools due to:
  - Reduction in **process cycle times** (46% of benefit)
  - Reduction in **process re-work waste** (33% of benefit)
  - Reduction in NGSS travel expenses (22% of benefit)
- Note: these benefit figures will not be found in any NGSS financial statements





# What do these large benefit figures mean to NGSS & the Enterprise?

- These benefit figures represent how much more the DD(X) program would have cost if the KM investments were not made
  - The significant size of the figures justify the claim that the DD(X) program might not be feasible without the in-place collaborative environment
- Of Note:
  - 100% of interviewees attributed some of their reductions in process cycle times and re-work to the decrease in *Waiting Wastes*
  - 66% of interviewees also identified reductions in *Transportation* and *Unnecessary Motion Wastes* due to the KM tools



# Case Study Conclusions

1. The feasibility of the DD(X) program would be much more challenging without the current, in-place collaborative environment
2. The KM collaborative environment is enabling the relatively new shipbuilding philosophy of *Total Ship Systems Engineering (TSSE)*
3. The KM collaborative environment has effectively tied together over 5,000 workers in order to deliver the customer a product containing historical levels of cutting-edge technology



# QUESTIONS?

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