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Value Engineering... ...in the Lean Environment

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This article addresses two aspects of teaming Value Engineering (VE) methodologies and Lean principles to produce outstanding results. The first is that of using value methodologies to outline the value stream of a process that is then "Leaned" through Rapid Improvement Events. The second is that of identifying products during Lean events that are in need of reliability and maintainability improvements. Then, using Value Methodologies in a workshop environment to improve those products.

The Sustainment Engineering Center of the Crane Division, Naval Surface Warfare Center provides excellent support to legacy Naval Systems. That support includes Component Obsolescence review and analysis, Open Systems Engineering, Reverse Engineering and low-rate, interim support manufacturing. In the past these efforts were "stove-piped" individually to support specific programs and requirements. Recently we decided that we should integrate this effort to the benefit of our Sponsors and Fleet Customers.

NSWC Crane, being an advocate and "doer" of continuous improvement, decided to develop our new strategy using both value engineering methodology and lean principles.



We began by conducting a Value Engineering Workshop for the purpose of 1) learning the value methodology, for those who were not familiar, and 2) establishing a base-line, integrated Sustainment Engineering process in the form of Functional Analysis Systematic Techniques (FAST).

The FAST charts (Exhibits 1 & 2), describing our process, were then used to develop our Value Stream map that was used in a follow-on Value Stream Analysis (VSA).

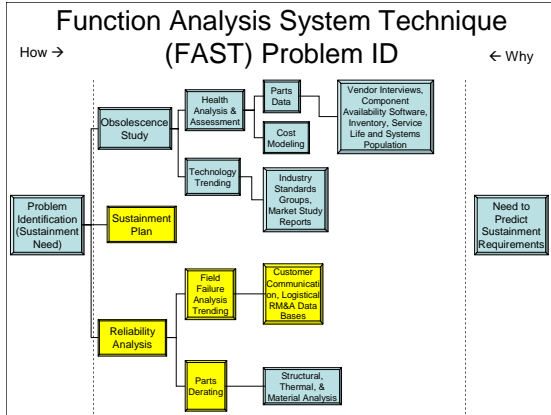


Exhibit 1

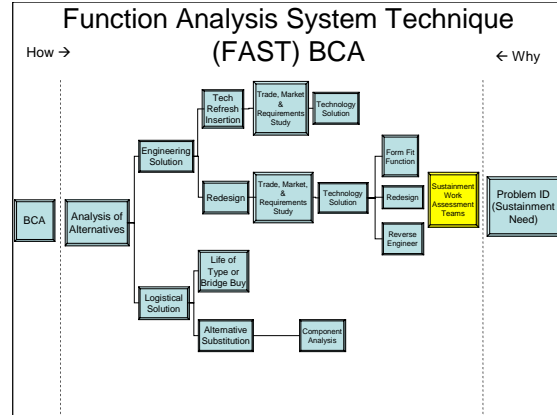


Exhibit 2

The VSA identified Projects and Rapid Improvement Events to further improve the process and remove any identified non-value added waste.

Sustainment Engineering Process Next Steps

- Value Engineering Workshop findings provided as input to LEAN VSA
 - Reliability Analysis
 - Sustainment Plan
 - Sustainment Engineering Process

NSWC, Crane

Another example of how NSWC Crane has implemented Value Engineering in the Lean environment is in our Enterprise Innovation initiative, where we looked at improving the Operational Availability of a shipboard electronic system by reducing/improving the time from which a component fails on-board ship, until it is repaired and returned to "ready-for-issue" condition.



Enterprise Innovation VSA

We conducted a Value Stream Analysis of the process used to identify system failures, replace and perform depot repair on the failed items and have them ready for issue. During the analysis, we identified and studied component items that were major reliability and maintainability issues. As shown in Exhibits 3 through 6, several of the items were identified as reliability, maintainability, sustainability and cost driver issues.

Item Name	% Total Failures	% Total Population	Qty	Unit \$	Total \$
Output TWT	39	2.6	342	\$4258	\$1341.7K
HVDU	9	5.3	41	\$4645	\$299.2K
HVPS	8	6.8	53	\$4466	\$267.0K
RF Mod B2	5	0.9	49	\$4719	\$173.5K
Tape Drive	4	10.3	17	\$3481	\$129.6K
RF Mod B3	3	0.2	26	\$3459	\$87.9K
RFMU			5	\$14504	\$76.0K
RF Switch (2x32)	2	4.1	15	\$4879	\$72.1K
Yig Flt BD3 CCA	1	2.2	4	\$14571	\$42.9K
Other	27		1280		\$930.6K
System Level			1832		\$3420.5K
Cost per System					\$41.7K

Exhibit 3

Item Name	Part #	%CA of Total	CAs	MTBF
HVDU	848399-2	9	76	10,000
Tape Drive	848391-1	2	17	13,000
HV Relay Control	927560-1	2	19	21,000
Pump Motor	15287	1	9	24,000
Keyboard	852032-5	1	7	31,000
Hard Disk System	G258927-1	1	5	44,000
System Level Totals			865	970

Exhibit 4

Supportability Drivers
April 2002 thru March 2003

System Level Ao = 0.67 (Last 12 Months)						
Item Name	Part #	NL	MLT	Tot Log	%NO B	New System Ao (w/ no log. Delay)
Output TWT	848055-1	145	250	35,862	73	0.674
HVDU	848399-2	19	310	6,580	53	0.673
HV Relay Control	927560-1	14	290	4,044	82	0.671
HVPS	848399-1	12	260	3,124	24	0.671
Tape Drive	848391-1	7	340	2,414	41	0.675
System Level Totals		533	530	183,489	62	

Exhibit 5

Maintenance Drivers
April 2002 thru March 2003

Item Name	Part #	% of Total Hrs	CA	MTTR	TOT CM (Hrs)
HVDU	848399-2	13	76	6.0	457.9
HVPS	848399-1	10	65	5.8	376.2
Output TWT	848055-1	5	200	1.0	198.5
Tape Drive	848391-1	4	17	7.5	128.2
Output TWT	VTR-6110-A3	3	30	3.1	92.3
Other		65			
System Level Totals			865	11.0	3609.3

Exhibit 6

Those items that showed up on all four charts, were prime candidates for cost effective improvements. Three of those items were already being re-designed for improvements. The Traveling Wave Tube (TWT) had not been seriously studied yet for improvement due to its unique technology. The TWT became our candidate for a Value engineering Workshop. The Value Engineering Workshop team called upon the assistance of a TWT Subject Matter Expert (SME) to see what the alternatives would be to improve the life of the TWT. After reviewing the technical characteristics of the TWT, the SME determined that by reducing the heater voltage of the TWT, the life of the TWT could be doubled. In this scenario we used Lean techniques to identify reliability/maintainability issues for improvement through VE methodology.

In conclusion, we have found that neither VE nor Lean will exclusively solve all issues. It requires a blend of both methods to achieve maximum results in improving products and processes and lowering life-cycle costs for our Warfighters.

Value Engineering can bring synergy to efforts to implement Lean principles and practices in your organization and vice-versa. If you are currently implementing Lean principals and practices, including VE can significantly enhance your overall efforts to reduce cost and improve value by using VE to not only leverage your Lean efforts, but also address areas not within the normal methodological purview of Lean.

$$\text{Value} = \text{Function (VE)} / \text{Cost (Lean)}$$

VE is flexible – Lean, on the other hand, brings to bear a group of structured operating principles and practices that can transform an organizations culture, productivity, profitability, and customer relations. Separately, VE and Lean are approaches with much to offer. Together, they offer great synergy. There should not be any conflict or compromise between the approaches. By considering the

strengths and weaknesses of each discipline, a collaborative environment can be developed.