NAVSEA Cost Engineering and Industrial Analysis
Cost Tools Update
for
DoN Cost Analysis Symposium

SEA05C Information Management System
NAVSEA Common Cost Model
Risk Allocation Process

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Distribution Statement A: Approved for Public Release,
Distribution is unlimited.

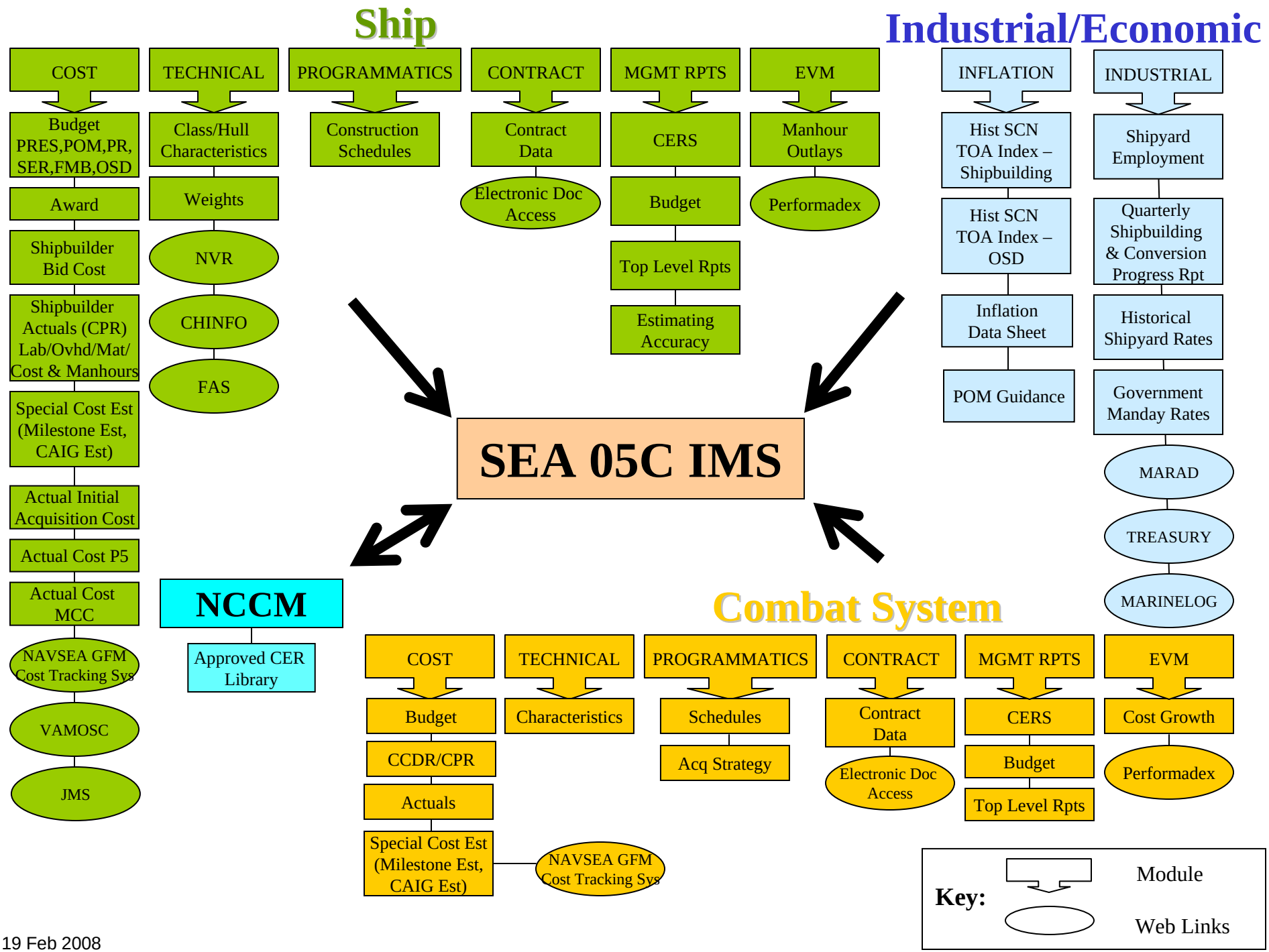
Topics

- SEA05C Information Management System (IMS)
- NAVSEA Common Cost Model (NCCM)
- Mapped Values Risk Allocation Process

SEA05C Information Management System Overview

- The development of the IMS database structure started in FY06. The ship module was completed in July 2007.
- The Combat System Module leverages off of the development of the IMS Ship Module and its lessons learned.
- All components of Combat System Module (Cost and Contracts, Budget, Programmatics, Technical, FPRA) are in final testing.
- Web based application
- Server hosted by Naval Center for Cost Analysis
- Report formats (Microsoft Excel, xml, PDF)

Establish an information system to support timely, accurate and complete NAVSEA cost engineering products for our ship and combat system programs


Ship
Industrial/Economic
COST
TECHNICAL
PROGRAMMATICS
CONTRACT
MGMT RPTS
EVM
INFLATION
INDUSTRIAL
Budget PRES,POM,PR, SER,FMB,OSD
Award
Shipbuilder Bid Cost
Shipbuilder Actuals (CPR) Lab/Ovhd/Mat/ Cost & Manhours
Special Cost Est (Milestone Est, CAIG Est)
Actual Initial Acquisition Cost
Actual Cost P5
Actual Cost MCC
NAVSEA GFM Cost Tracking Sys
VAMOSC
JMS
Class/Hull Characteristics
Weights
NVR
CHINFO
FAS
Construction Schedules
Contract Data
Electronic Doc Access
CERS
Budget
Top Level Rpts
Estimating Accuracy
Manhour Outlays
Performadex
Hist SCN TOA Index – Shipbuilding
Hist SCN TOA Index – OSD
Inflation Data Sheet
POM Guidance
Shipyard Employment
Quarterly Shipbuilding & Conversion Progress Rpt
Historical Shipyard Rates
Government Manday Rates
MARAD
TREASURY
MARINELOG
SEA 05C IMS
NCCM
Approved CER Library
Combat System
COST
TECHNICAL
PROGRAMMATICS
CONTRACT
MGMT RPTS
EVM
Budget
CCDR/CPR
Actuals
Special Cost Est (Milestone Est, CAIG Est)
NAVSEA GFM Cost Tracking Sys
Characteristics
Schedules
Acq Strategy
Contract Data
Electronic Doc Access
CERS
Budget
Top Level Rpts
Cost Growth
Performadex
Key:
Module
Web Links

19 Feb 2008

SEA017 IMS Database - Microsoft Internet Explorer provided by NMCI

File Edit View Favorites Tools Help

Back Search Favorites

Address Go Links SnagIt

SEA 05C IMS

- Ship
  - Cost
  - Technical
  - Programmatics
  - Contracts
  - EVM
  - Mgmt Reports/Analysis Tools
- Combat System
  - Budget
  - Cost
  - Contracts
  - FPRA
  - Programmatic
  - Technical
- Industrial/Economic
  - Shipyard Employment
  - Inflation Tables
- Administration
  - User Maintenance
  - Ship Database Maintenance
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SEA 05C
Information Management System

U.S. Navy Photo by PH2 Gabriel Wilson (photo # 000618-N-0147W-001)

Cost Engineering & Industrial Analysis Division

Naval Sea Systems Command

Trusted sites

What's Next with IMS ?

- Grant access to Navy Cost Community users
- Complete testing of combat system modules
  - ECD: mid-Nov 2009
- Locate and fill in gaps in data
- Correct minor problems
- Identify enhancements

NAVSEA Common Cost Model (NCCM)

Objective

- Consolidate and standardize NAVSEA cost estimating tools and models
  - A different model for every program
- Provides for effective configuration control, documentation and formal verification/validation of models
- Increase consistency and provide for standardized inputs/outputs
- Incorporate estimating "best practices" both current and future
- Allows for a more flexible workforce

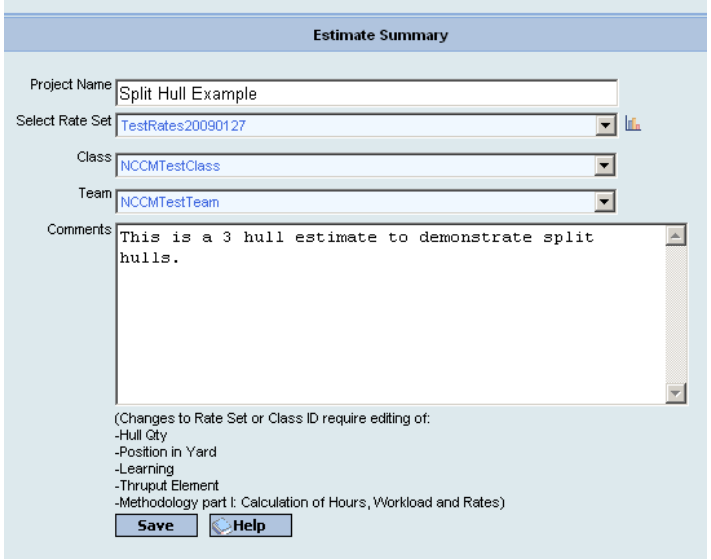
Attributes

- Standard process oriented framework using a step by step flow
- Leverages use of libraries and data sets such as:
  - Shipyard workload/rate assumptions
  - Material inflation tables
  - Cost Estimating Relationship (CER) libraries
  - Tech Data, CER and other Data Sets
- Support cost risk analysis process
- Uses menu to "assign" input sets to hulls prior to calculation
- Calculation options based on user needs
- Provides standard output reports that can be integrated into more detailed documentation of the estimate

Analysts can focus on subject matter expertise and analysis instead of varied modeling practices...don't need to learn a new model for each program

Integrated Rates – Workload Capability

- NCCM uses both workload and rate set assumptions in development of rates for specific estimates
  - Ships in estimate are "linked" to ships in rates – workload data set
- User ability to run "what if" scenarios varying workload assumptions for ships within their "class"
  - Include all ships in the estimate
  - Exclude specified ships from the estimate, but retain their impact in the workload assumptions
  - "Delete" ships from the rate – workload assumptions
  - "Add" new ships in the estimate that are NOT in the assumptions
- Ability to select different baseline scenario workload – rates data sets for use in estimates
  - Supports development of estimates for major variations across the SCN/NDSF portfolio
  - Used to consider "cross class" impacts



	Include	Split	Ship	Ship Name *	Comment	Job Type (DE, NC)	Job Status	Shipyard	Program Year	Award Date (mm/dd/yyyy)	Start Constr. Date (mm/dd/yyyy)	Delivery Date (mm/dd/yyyy)	Material Midpoint Date (mm/dd/yyyy)	Production	Engineering	ProdHistCode	EngHistCode
Edit	Include Exclude Delete		101	NTC 101		NC	CURRENT	Yard2	2004	12/15/2004	02/15/2005	08/15/2008	06/18/2006	1500000	1000	707	100
Edit	Include Exclude Delete		100	NTC 100		DE	CURRENT	Yard1	2005	12/15/2005	11/15/2005	10/15/2008	02/04/2007	0	500000	707	100
Edit	Include Exclude Delete		201	NTC 201		NC	FUTURE	Yard2	2008	06/15/2008	03/15/2009	11/15/2011	11/07/2009	1500000	1000	707	100
Edit	Include Exclude Delete		501 501	NTC 501 NTC 501		NC NC	FUTURE FUTURE	Yard2 Yard2	2009 2009	06/15/2009 06/15/2009	03/15/2010 03/15/2010	11/15/2012 11/15/2012	11/07/2010 11/07/2010	1500000	1000	707 707	100 100
Edit	Include Exclude Delete		200	NTC 200		NC	FUTURE	Yard1	2009	06/15/2009	05/15/2010	01/15/2013	12/04/2010	1500000	1000	707	100
Edit	Include Exclude Delete		502 502	NTC 502 NTC 502		NC NC	FUTURE FUTURE	Yard2 Yard2	2009 2009	11/15/2009 11/15/2009	08/15/2010 08/15/2010	04/15/2013 04/15/2013	04/08/2011 04/08/2011	1500000	1000	707 707	100 100

All example scenarios use fictitious data

"Instant" Rate Updates Within The Estimate

- Shipyard workload updated to account for modifications resulting from the estimate
- Ability to review and modify the composite rates computed for this estimate

Select Material Inflation: GLOBAL INSIGHT : GLOBAL INSIGHT - Monthly Material Non-nuclei

Ship	Ship Name	Split	Ship Yard	Unit	Tech Set	Labor Cer Set	Labor PRD Set	MAT Cer Set	MAT MAF Set	Global Input Set
500	NTC 500		Yard1	2.000	Total Ship	Prime	Prime	Prime	Prime	LeadShip
501	NTC 501		Yard1	3.000	Total Ship	Prime	Prime	Prime	Prime	LeadShip
502	NTC 502		Yard1	4.000	Total Ship	Prime	Prime	Prime	Prime	LeadShip
501	NTC 501		Yard2	3.000	Total Ship	Prime	Prime	Prime	Prime	LeadShip
502	NTC 502		Yard2	4.000	Total Ship	Prime	Prime	Prime	Prime	LeadShip

1. Save Methodology 6/17/2009 10:11:29 AM

Help

Workload / Rates Calculation

Calculate all steps at once...

Step 1 Calc Hours, Workload & Rates

- OR -

Calculate steps individually.

Step 1 Calc Hours 6/17/2009 10:42:00 AM

Step 2 Calc Workload 6/17/2009 10:42:09 AM

Step 3 Calc Rates 6/17/2009 10:42:32 AM

Refresh Timestamps

Yard Level Detail Inputs

Ship#	Ship	Yard	Pos	Year	Award Date	Start Construction Date	Delivery Date	Midpoint Date	Prod Hours	Eng Hours
500	NTC 500	Yard1	2.000	2009	11/15/2009	10/15/2010	06/15/2013	05/05/2011	6,011,184	1,753,262
501	NTC 501	Yard1	3.000	2010	11/15/2010	10/15/2011	06/15/2014	05/04/2012	5,651,889	1,648,468
502	NTC 502	Yard1	4.000	2011	11/15/2011	10/15/2012	06/15/2015	05/04/2013	5,410,066	1,577,936
501	NTC 501	Yard2	3.000	2009	06/15/2009	03/15/2010	11/15/2012	11/07/2010	5,651,889	1,648,468
502	NTC 502	Yard2	4.000	2009	11/15/2009	08/15/2010	04/15/2013	04/08/2011	5,410,066	1,577,936

Edit	Group 1-7,9 ($/Hr)	Lab OH 1-7,9	Mat OH 1-7,9	Group 8 ($/Hr)	Lab OH 8	Mat OH 8	FCCM 1-7,9	FCCM 8	IS 1-7,9 ($/Hr)	IS 8 ($/Hr)	Profit	PlanRT	PlanLabOH	PlanMatOH
Edit	16.868	0.35470	0.00000	27.893	2.07960	0.00000	0.01000	0.01000	0.00000	0.00000	0.05000	0.000	0.00000	0.00000

Help

All example scenarios use fictitious data

Risk Adjusted Point Estimate

- Select confidence level and determine risk adjusted point estimate
- Identifies risk "cost"
- Allocates risk "cost" against elements with risk distributions

Report Selection

Current Project Name: Split Hull Example for Peter 539

Summary Detailed Report | P-5 Report | Placemat Report
S Curve | Tornado Chart | Spider Chart
Sensitivity Chart | Risk Allocation

Pick Ship: NTC 500
Pick a Confidence Level: Select Confidence Level
Life Cycle Cost Point Estimate
Life Cycle Cost at Confidence
Risk Cost
Calculate using new PE: Calculate | Spider 80-20 | Variance

INTERMEDIATE RISK ALLOCATION RESULT

Risk Allocation Details | Labor Hours | Labor Dollars | Material Dollars | Labor+Mat Dollars

Pick Ship: NTC 500
Pick a Confidence Level: 25
Life Cycle Cost Point Estimate: 519,494,399
Life Cycle Cost at Confidence: 532,826,708
Risk Cost: 13,332,309
Calculate using new PE: Calculate | Spider 80-20 | Variance

INTERMEDIATE RISK ALLOCATION RESULT FOR SHIP: NTC 500 @ CONFIDENCE LEVEL: 25

Risk Allocation Details | Labor Hours | Labor Dollars | Material Dollars | Labor+Mat Dollars

ID	Rows with distributions	Variance	Abs(range)	Sum	% of Sum	Risk$ Alloc	+/- Risk$ Alloc
1537	Plans Factor (off Basic Price or Hours)	135,734,964,872,942	135,734,964,872,942	3,279,023,128,597,116	0.041394	551,878	551,878
1538	Group 800 factor to estimate Labor Hours	485,769,850,040,741	485,769,850,040,741	3,279,023,128,597,116	0.148144	1,975,102	1,975,102
1539	Group 900 factor to estimate Labor Hours	3,051,695,471,990	3,051,695,471,990	3,279,023,128,597,116	0.000930	12,399	12,399
1540	Learning Slope 100	108,906,982,246,799	108,906,982,246,799	3,279,023,128,597,116	0.033213	442,806	442,806
1541	Group 100-700, 900 FPR $/HR	1,801,289,706,300,401	1,801,289,706,300,401	3,279,023,128,597,116	0.549337	7,323,931	7,323,931
1542	Group 800 FPR $/HR	526,195,137,336,352	526,195,137,336,352	3,279,023,128,597,116	0.160473	2,139,476	2,139,476
1543	Material Inflation Risk Adjustment Multiplier	31,781,172,054,946	31,781,172,054,946	3,279,023,128,597,116	0.009692	129,217	129,217
1544	LCER: Hull Structure	95,914,299,394,325	95,914,299,394,325	3,279,023,128,597,116	0.029250	389,970	389,970
1545	LCER: Deckhouse Structure	15,881,379,957,599	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

All example scenarios use fictitious data

Risk Allocated Estimates
Purpose

- One of SEA 05C's (Naval Sea Systems Command - Cost Engineering and Industrial Analysis) strategic initiatives from 20 Feb 2007 was to create a methodology for allocating risk dollars to the P5 budget exhibit level
- Need ability to take a deep dive on risk allocated estimates – determine inputs at the same level in which the estimate was built
- Need ability to take money away from point estimate if necessary
- Need risk allocation process to take correlation into consideration when allocating
- Evaluated current methodologies and determined creating our own risk allocation process was the best way to accomplish all goals
- Collaborative effort between NAVSEA05C, NSWCCD, NAVAIR, and Industry

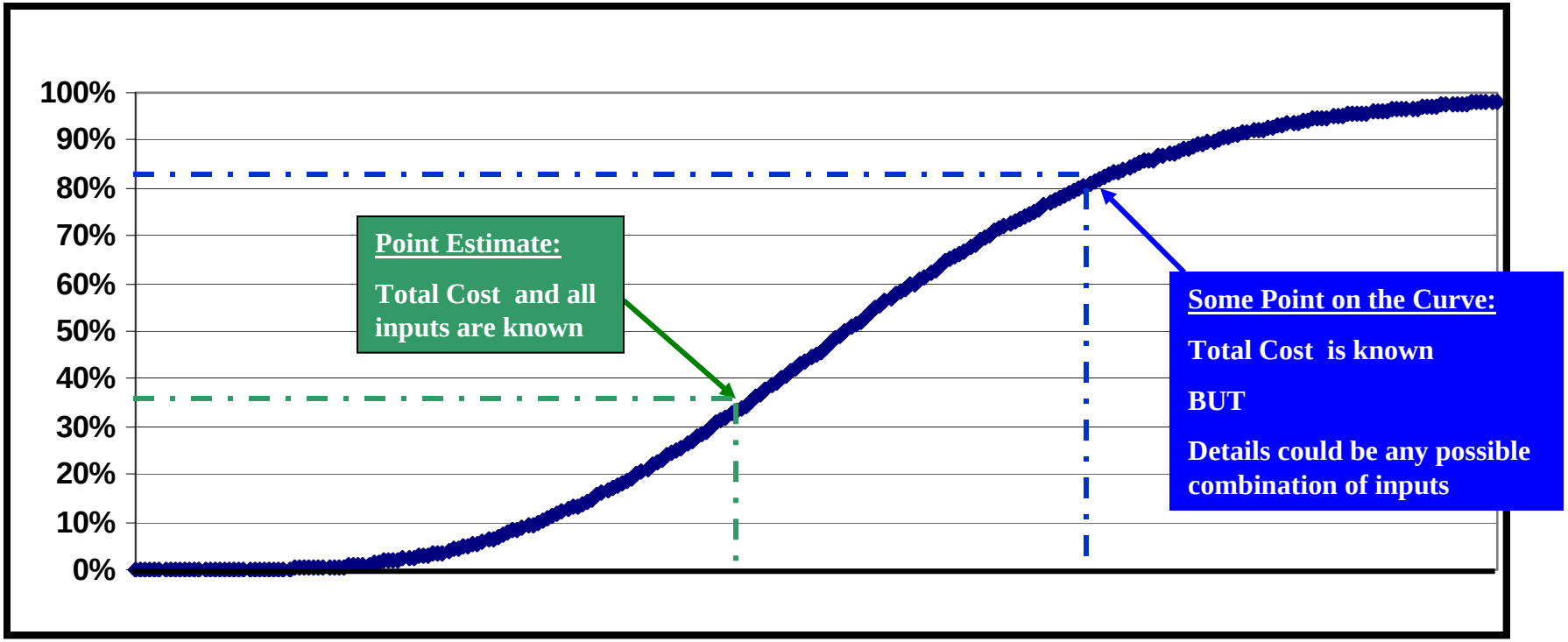
NAVSEA WARFARE CENTERS Carderock Division

NAVAL SEA SYSTEMS COMMAND SEA 05C COST ENGINEERING & INDUSTRIAL ANALYSIS

Industry

NAVAIR

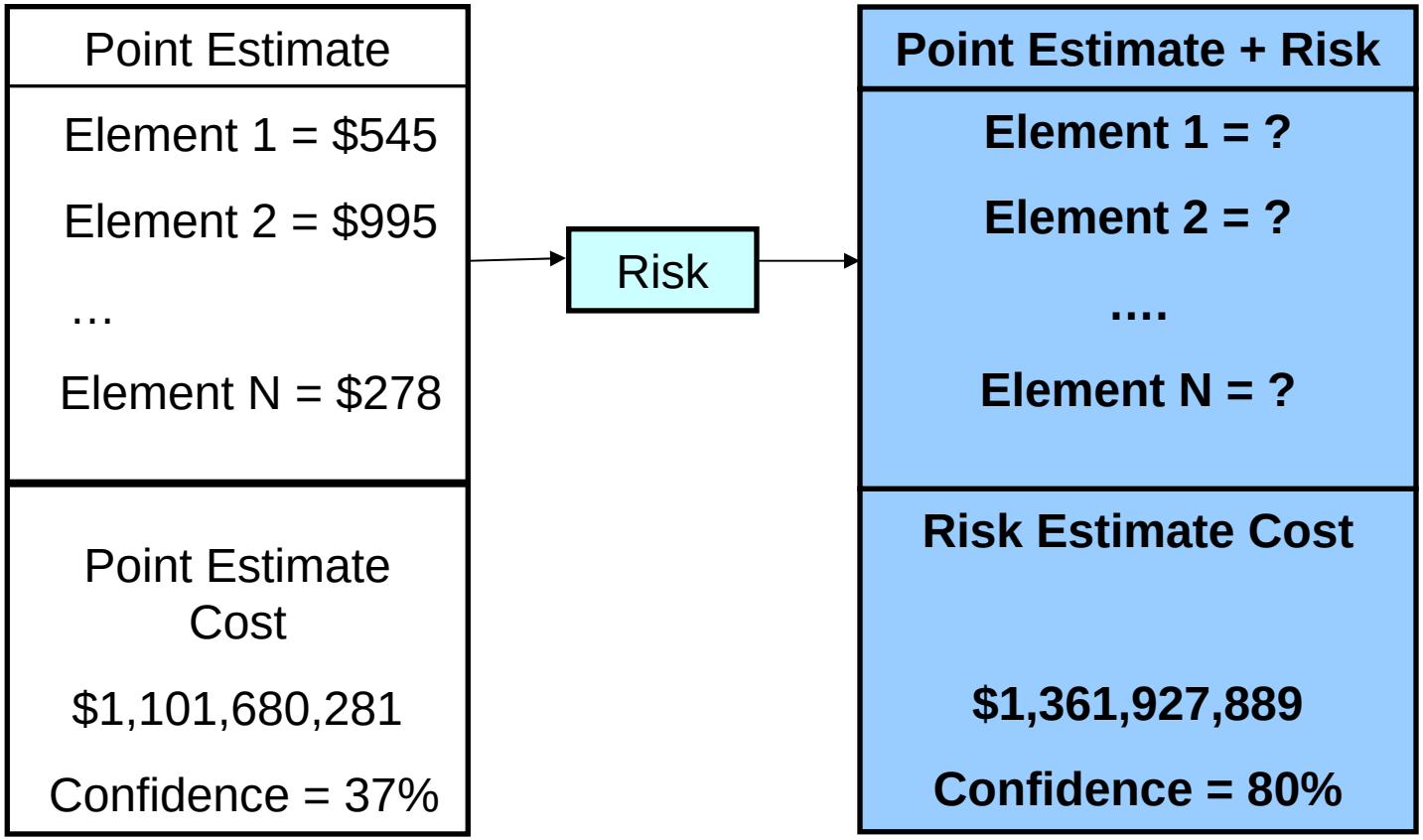
Interpreting "S" Curves



- Decision Maker decides to fund to a different total cost
  - What comprises this Total Cost?
- How can we as estimators provide some breakdown / insight to input level elements (especially if input level elements are not dollar inputs)?

Problem

- Analysts know the total cost associated with a desired confidence, but cannot determine the input level elements that created the specified total cost
  - What is a representative overhead percentage for the chosen confidence (80%)?



Mapped Values Risk Allocation Process

- Allocates based on input level element's "Mapped Value"
- Mapped Value: amount of standard deviations total cost is moved when input level element is moved one standard deviation
  - Example: If Overhead Percentage has a mapped value of 27%, that indicates one standard deviation shift in the Overhead Percentage input will move the total cost 27% of a standard deviation
- Crystal Ball uses Rank Correlation instead of Mapped Values (@RISK) but both are measuring the same effects
  - Mapped value = rank correlation * standard deviation of the output variable