

Headquarters Air Mobility Command



**Case Study:
A Tailorable Cost-Benefits Approach
to Evaluate Cognitive Process Improvements in
Complex C2 Endeavors**

by

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CBP PROCESS



FAA	FNA	FSA
<ul style="list-style-type: none">■ Capabilities■ Tasks■ Attributes■ Metrics	<ul style="list-style-type: none">■ Gaps■ Shortfalls■ Redundancies■ Risk Areas	<ul style="list-style-type: none">■ Non-material Solutions■ Material Solutions■ S&T Initiatives■ Experimentation■ Cost-Benefit Analysis



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Work Centered Interfaced Distributed Environment (WIDE)



WHAT IT IS:
 Advanced Human-Computer Interfaces (HCI) to Plan, Monitor, and Synchronize Global Airlift Missions.

BENEFITS TO THE WARFIGHTER:

- More Effectively Monitor and Replan Missions
- Increased Mission Plan Situational Awareness
- Reduced Replan Time, Accuracy, and Mental Workload
- Increase Situational Awareness for Viable Courses of Action for Short Notice Missions

THE TECHNOLOGY:

Work-Centered Support Systems

- Supports Cognitive Aspects of Work
- Cognitive Based Visualization & Automation
- Human-Centered Upgrades to C2 Systems

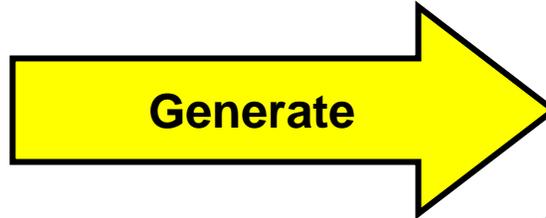
AFRL/RI Multi-Mission Optimization



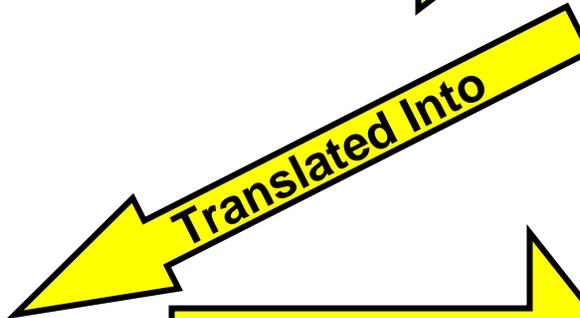
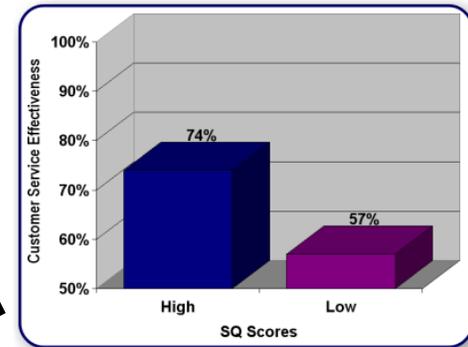
Quantifying “Soft” Benefits (Nailing Jell-O to the Wall)



How Does Improved
Cognitive Performance



Improved
Job Performance



Financial Benefits



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Introduction to

Cost-Benefit Calculation

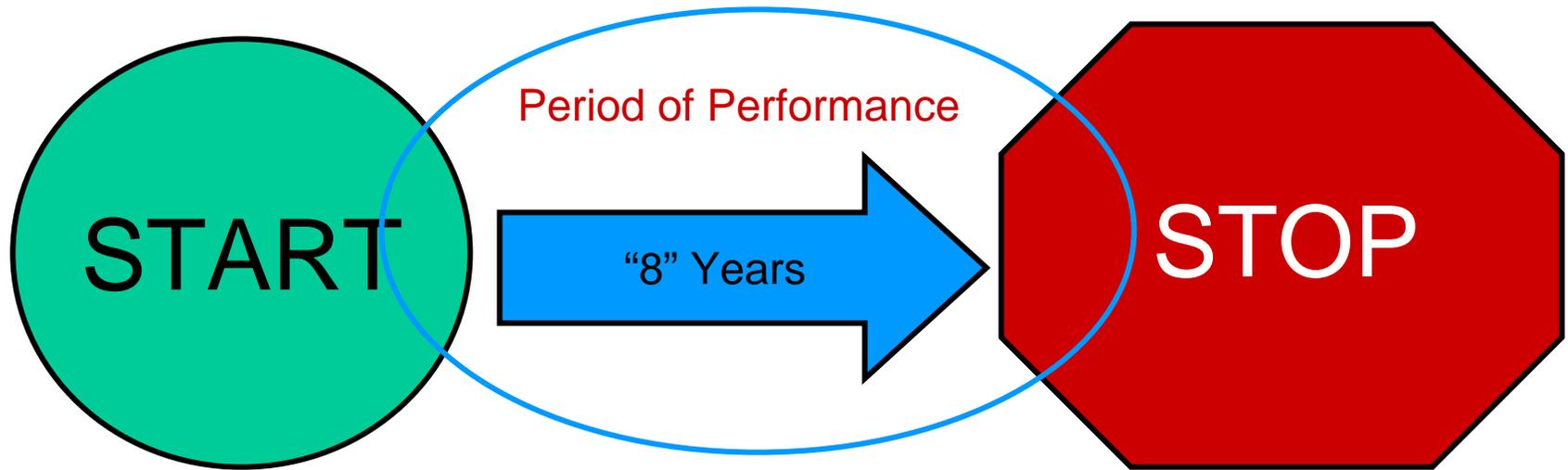


- A Period of Performance
- A Template Structure
- A List of Benefits and a List of Costs
- Estimated or Actual Data Values
- Calculation Display
- Essential Lessons

Elements of a Basic Cost-Benefit Analysis



Period of Performance



Need a Start Year and an End Year

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Template Structure



	PERIOD OF PERFORMANCE
COSTS	
BENEFITS	
SUMMARIES	

Four Blocks

Provides a Matrix and Calculation Structure

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Template Structure



	PERIOD OF PERFORMANCE							
	2008	2009	2010	2011	2012	2013	2014	2015
COSTS Development Integration Sustainment								
BENEFITS Mission Managers Tails During Operations Aerial Port Activities								
SUMMARIES Cost-Benefit Ratios Return on Investment								

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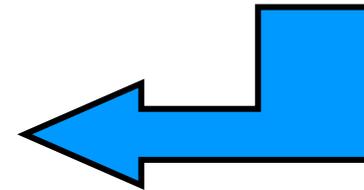
2 LISTS -- Initial & Refined

Brainstormed List of Benefits

- Improved Situational Awareness
- Situational Awareness of Mission Details
- Improved Situational Awareness at Focal Location
- Improved Situational Awareness of Problems Resulting from Mission Changes
- Ability to Identify Aircraft for Tasking
- Ability to Develop a Feasible Plan
- Reduces Decision Making Time
- Improves Decision Making by Allowing Fewer Negative Consequences
- Reduces the Possibility of Errors
- Improves Efficiency of Resource Utilization
- Better Decisions for Short Notice Missions
- Reduced Operator Workload

Initial Thoughts of SMEs and Others

Lengthy First Take



Refined List of Benefits

- MISSION MANAGERS
 - Dynamic Retasking
 - Situational Awareness
 - Fewer Critical Errors
 - Improved Decision Making
- TAILS DURING OPERATIONS
 - Fewer Delayed Missions
- AERIAL PORT ACTIVITIES
 - Asset and Resource Management

Improved Granularity



Consolidated/Refined List



The Values



Estimated or Actual Data Values

Expressed In:



is



Sources:

- ✓ **History**
- ✓ **SMEs**
- ✓ **Placeholder WAGs**
- ✓ **Experimental Findings**

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Calculation Display (Not Actual Values)



COSTS	2008	2009	2010	2011	2012	2013	2014	2015
Dev		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Integration	\$ 20	\$ 10						
Sustainment	\$ 10	\$ 15	\$ 35	\$ 15	\$ 35	\$ 15	\$ 15	\$ 15
ANNUAL \$ COSTS	\$ 30	\$ 25	\$ 35	\$ 15	\$ 35	\$ 15	\$ 15	\$ 15

BENEFITS	2008	2009	2010	2011	2012	2013	2014	2015
Mission Manager	5	10	150	150	150	150	150	150
Tails during Opns	50	\$ 100	\$1,000	\$1,000	\$ 1,000	\$1,000	\$1,000	\$1,000
Aerial Port Opns	2	\$ 5	\$ 50	\$ 50	\$ 50	\$ 50	\$ 50	\$ 50
ANNUAL \$ BENEFITS	\$ 57	\$ 115	\$1,200	\$1,200	\$ 1,200	\$1,200	\$1,200	\$1,200

SUMMARIES								
Benefit / Cost Ratio	1.9	4.6	34.3	80.0	34.3	80.0	80.0	80.0
Return on Investment	1.9	3.1	15.2	24.5	26.9	32.1	36.3	39.8

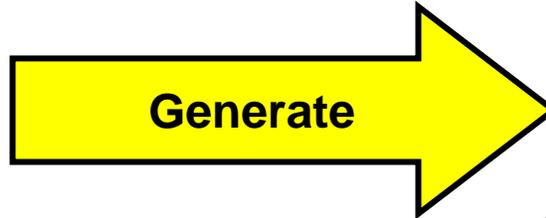
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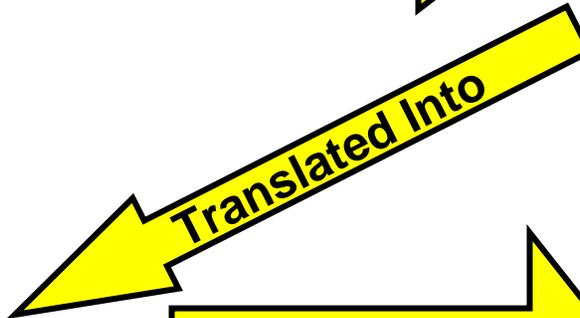
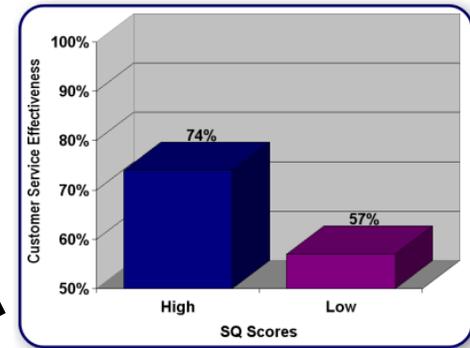
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Financial Benefits



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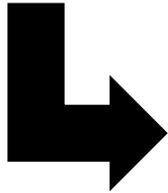


From “Soft” to Measurable



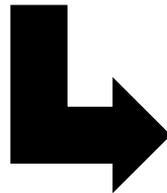
COGNITION

- Improved Situational Awareness
- Reduced Mental Workload



PERFORMANCE

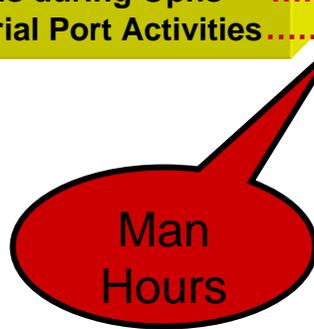
- Faster Answers
- Fewer Errors



IMPACTS ON:

- Mission Managers
- Tails during Opns
- Aerial Port Activities

.....Quicker Re-Tasking of Missions
.....Fewer Delays
.....Less Idle Time





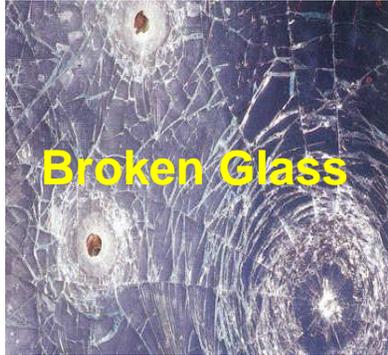
**...from Measurable ...to \$\$\$ Impacts
(It's Mostly Arithmetic)**



IMPACTS ON:	Variables (mainly TIME!) Needed to Calculate	“Soft” Benefits QUANTIFIED into \$\$\$
MISSION MANAGERS: Quicker Retaskings	\$ per Mission Manager Hour # Retaskings per Year <u>Hrs to Deliver a Retasking Order (w/o WIDE)</u> Hrs to Deliver a Retasking Order (w/WIDE)	Annual \$\$ Value of FEWER MSN MANAGER RETASKING HOURSw/WIDE
TAILS during OPERATIONS: Fewer Delays	\$/Flying Hour # MSNs per Year % MSNs Delayed/Yr (w/o WIDE) # MSNs Delayed/Yr (w/oWIDE) <u>Avg. Hrs per Delayed MSNs/Yr (w/o WIDE)</u> % MSNs Delayer/Yr (w/WIDE) # MSNs Delayed/Yr (w/WIDE) Avg. Hrs per Delayed MSNs/Yr (w/WIDE)	Annual \$\$ Value of AVOIDED DELAYS (i.e., FLYING HOURS)w/WIDE
AERIAL PORT OPERATIONS: Less Idle Time	MHr Cost # People per Crew MsnHandlingEquipment Hourly Cost # MHEs per MSN Load MHrs Idle Time per Msn (w/o WIDE) <u>MSNs per Year</u> % Idle Time Reduced (w/WIDE) per MSN	Annual \$\$ Value of IDLE TIME AVOIDEDw/WIDE



More Types of “Soft” Benefits to Exploit



\$\$\$
IMPACTS!!



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Essential Lessons



Collaborate! Brainstorm!



Use a Template – with Feeders



For Data Values, Make Generous Use Of:

- SME Inputs
- Experimental Results
- Placeholder WAGs



Collaborate!



It's Flexible! It's Tailorable!

- Useful for Other Proponents



Bottom Lines



To Win the Budget Fight You Need a One-Two Punch!!

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Questions?



Questions?
No, You Don't Have
Any Questions!

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