Data Based Decision Making

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May 2019

“Making the most of our dollars and sense”
Agenda

- What is Data Based Decision Making?
- What is Data?
- Too Much Data?
- Way Ahead
What is Data Based Decision Making (DBDM)?

Thoughts?
- Avoiding emotions
- Using facts to decide something
- Scientifically based
- Looking at historical performance
- Quantitative data only
- Irrefutable methodology
- No opinions
- Unbiased
DBDM Defined

- No standard definition
- Most google references relate to school decisions
- Working Definition:

  The use of documented information and explicit methodologies to provide a recommended course of action to decision makers
Why is DBDM an Issue?

- Less money for defense in recent years
- Efficiencies desired
  - Need to validate “savings”
  - Must balance cost, benefits, and risks
- Increased scrutiny in decision making process
  - HQ oversight, Congressional queries, etc…
- Part of the AF IG inspection criteria

Bottom line: The right thing to do
Now Part of the AF Inspection Program

These are the 4 Major Graded Areas in the AF Inspection Program

- Managing Resources
  - Primary Mission
    - AEF Readiness
  - Mission-Assurance C2
  - Warfighter or USAF CC satisfaction
    - Right quality
    - Right quantity
    - Right time
- Executing the Mission
  - Measures
- Leading People
  - Communication
    - Discipline
    - Training
    - Development
    - Quality of Life Engagement
- Improving the Unit
  - Strategic Alignment
  - Process Operations
  - CC's Inspection Program (CCIP)
  - Data-Driven Decisions
Data Collection is only one part of the DM effort
DBDM Status

➢ Aren’t we already doing this

➢ Decision Makers don’t just flip a coin

➢ Many corporate processes data based
  • Acquisitions
  • Budgeting
  • Future Planning
  • Hiring/Annual Appraisals
  • Operational Decisions

Real issue is the “Correctness” of the data
What data did you use to be here today?

To attend this seminar
- Content review
- Past experiences with speaker
- Cool title
- Random selection

To attend PDI in general
- Need for CPEs
- Networking – who else is in attendance
- Aggregate value of individual sessions
DBDM is Really Part of the 8 Step Decision Process

1. Identify the Issue
2. Analyze the Issue
3. Develop Alternatives
4. Evaluate Alternatives
5. Make Recommendation
6. Make Decision
7. Implement
8. Evaluate

Different data is needed at each step of the decision making process.
Must Adapt to the Decision at Hand

- Gate
- Congestion
- BCA
- BRAC
- Acquisition
- Cost Estimate
- Go Do It
- Dorm EA

Analytical Scope

Level of Data Detail

Time Required
Agenda

- What is Data Based Decision Making?
- What is Data?
- Too Much Data?
- Way Ahead
We’ll use the last definition
  • More than just numbers
<table>
<thead>
<tr>
<th>Truth</th>
<th>Fact</th>
<th>Estimate</th>
<th>Guess</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few exist</td>
<td>Believed truth</td>
<td>Based on algorithm</td>
<td>Opinion Based</td>
<td>False information</td>
</tr>
<tr>
<td>Never change</td>
<td>Changes over time</td>
<td>Input accuracy</td>
<td></td>
<td>Intentional or accident</td>
</tr>
<tr>
<td>Gravity Pi</td>
<td>Center of solar system</td>
<td>Cost of dinner</td>
<td>Validity varies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of students</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>New program saves $</td>
</tr>
</tbody>
</table>

What types of Data do you use daily??
## What Type of Data Is This?

<table>
<thead>
<tr>
<th>Category</th>
<th>Type for You</th>
<th>Type for Me</th>
<th>Probable Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>US population</td>
<td>Guess</td>
<td>Fact</td>
<td>Fact, Estimate</td>
</tr>
<tr>
<td>Cost of a gallon of milk</td>
<td>Fact</td>
<td>Fact</td>
<td>Fact, Estimate, Guess</td>
</tr>
<tr>
<td>Calories I ate yesterday</td>
<td>Estimate</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>High temp yesterday (Den)</td>
<td>Guess</td>
<td>Fact</td>
<td>Fact, Estimate, Guess</td>
</tr>
<tr>
<td>Installation budget</td>
<td>Guess</td>
<td>Est</td>
<td>Est, Guess, Error</td>
</tr>
<tr>
<td>My weight</td>
<td>Error</td>
<td>Guess</td>
<td></td>
</tr>
</tbody>
</table>

**Truth, Fact, Estimate, Guess, Error**
Observations About Data

- Truth often not available
- Truth rarely needed

- Don’t mistake precision for accuracy
- We have data not TRUTH/FACTS in most cases

- More is not always better
- More accurate is not always better

- Balance time, effort, and criticality
What is the Cost of an Item?

Purchase cost – but it changes over time

- ROM
- Estimate
- Government estimate
- Bids received
- Contract award
- Obligation amount
- Adjustments
- Final expense

Other factors?
Other Factors to Consider

- Time to install
- Operating costs
- Ancillary items
- Facility modifications
- Overhead
  - FM
  - Contracting
  - Functional unit
  - Other base support agencies
- Disposal
Another Example
CE Repair Cost

What does it cost to replace a door?

- Direct
  - Door only

- Ancillary costs
  - Bench Stock
  - Electricity

- Labor
  - Mil or civilian
  - At what rate?

- Processing costs
  - Set/track up work order (paper, time, electric)
  - Functional time to order/oversee repair

- Infrastructure costs
  - CE tracking system, electricity
  - Truck to carry door

- Overhead and indirect
  - FM time to process billing?
  - Contracting time to buy door
  - Trans time to receive from vendor

- Others???

Who provides the numbers?
### Types of Estimates

<table>
<thead>
<tr>
<th>Type</th>
<th>Strength</th>
<th>Weakness</th>
<th>When to use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single point</td>
<td>Easy</td>
<td>Not relevant</td>
<td>Default value</td>
<td>Lottery</td>
</tr>
<tr>
<td></td>
<td>Unbiased</td>
<td>Accurate</td>
<td>No info</td>
<td></td>
</tr>
<tr>
<td>Guess/ROM</td>
<td>Easy</td>
<td>May be biased</td>
<td>Minor items</td>
<td>Move cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Experts present</td>
<td></td>
</tr>
<tr>
<td>Anecdote/example</td>
<td>System based</td>
<td>Similar</td>
<td>Replicating an existing item</td>
<td>Printer purchase</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relevant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grass roots</td>
<td>Detailed</td>
<td>Missing items</td>
<td>Complex systems</td>
<td>Aircraft procurement cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hard to build</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistical est</td>
<td>Unbiased</td>
<td>Hard to build</td>
<td>When causality is present</td>
<td>Mx cost/sq ft</td>
</tr>
<tr>
<td></td>
<td>Easy to apply</td>
<td>May not apply</td>
<td>Behavior of masses</td>
<td>Retention rates</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

**Best estimate depends on situation**
What Type of Data is Needed?

- Depends on use
  - Decision Making
  - Budgeting
  - Contracting
  - Payment

- Depends on scale
  - Pennies, dollars, thousands, millions

- Depends on time available
  - Must be sourced prior to need
  - Late is often useless

- Depends on scope
  - Percentage of overall program
Accuracy vs. Precision

- **Accuracy**
  - How right your estimate is
  - Depends on knowledge of situation and data available

- **Precision**
  - Level of detail in the estimate
  - Not explicitly tied to accuracy

- **Examples**
  - Pi – accuracy is/can be perfect, precision can vary
  - My weight on a scale
    - Precision depends on scale display
    - Accuracy depends on scale design/function
What to Do
If not Accurate Enough?

- Spend more time/effort
- Hire an expert
- Incorporate into Risk
- Change requirement/scenario
Agenda

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Fallacy of the Analyst

Structure ⇋ Thinking

In truth: Structure ⊇ Thinking

Thinking is a larger effort
  • Structure
  • Data
  • Analytical skills
  • Creativity
Checklist Culture

- Checklists are heavily emphasized in AF
  - Pilots
  - Space Crews
  - Missileers

- NOT a good approach to decision support

- Recognize when people are taking a linear approach to decision making
How can You Have too Much Data?

- **No time to analyze**
  - Must complete analysis before decision is made

- **Duplicate sources of same information**
  - Historical utility costs, CE estimate, civilian equivalent

- **Extraneous details**
  - Building will be blue and has stainless appliances

- **Irrelevant information**
  - B-52 data when estimating cost to operate F-35

Do you even have the right problem???
Defining the Problem Should Come BEFORE Data Collection

- Critical first step
  - Define the purpose of the analysis
    • What is the problem/scope?
  - Identify the decision maker
    • Who will make the final decision?
  - Develop an objective statement
    • Keeps from solving the wrong problem
Guidance vs. Direction

- Understand the difference and ask questions
  - Guidance is broader and provides autonomy
  - Direction involves following instructions

- Parallels decision support vs. checklist

- Shift from compliance-based analysis efforts, and increasing workload will likely result in shift toward guidance from leadership
Must Have the RIGHT Data

- Relevant to the decision
- Include both quantitative and qualitative data
- From the right source
- Properly analyzed and presented

More art than science in many cases!!!
Agenda

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Become More Data Driven TODAY!!!!

- Unfunded justification
  - What is real requirement
  - Is it in scope of base/unit’s priorities

- Open document review
  - Is line item justified
  - Can it be supported with DATA

- End of Year prioritization
  - Is list based on data or emotions/opinions
Use Overall Decision Support Framework

- Properly frame issue BEFORE collecting data
- Determine data needed and how used
- NOW collect data
  - Multiple sources?
- Analyze to ensure it’s relevant/correct
- Package to decision maker
- Review for future decision

A subset of the Decision Support process
DS a form of argument
- Take a position and convince other its correct
- Must understand how to “win” an argument to avoid being biased in analysis

Basic structure of an argument
- Premise – think assumptions
- Conclusion – think recommendation

Arguments are not necessarily confrontational
- Simply the shifting of someone’s position

Not all arguments are true
- Bad logic – not valid
- Bad inputs – not sound
- Biased interpretation of the data – questionable
Types of Logic or Structure

- **Induction**
  - Expands upon “facts”
  - “Truth” may not hold forever

- **Deduction**
  - Showing causal link to conclusion
  - If premise and logic is correct, answer MUST be correct
  - Type strived for in most cases

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P1: A ball falls when dropped
P2: A balloon is a form of a ball
C: Balloons will fall

**Issue:** Helium balloons
Where to Learn More

- Training available in several areas

More tailored DBDM training?? TBD
Summary

- Decision Making is now a focus area
- Must have relevant data to support decisions
- Need to tailor the data collected and presented
- AF is working to expand in this area
Estimates & Analysis Matter

I make it to the fence in 2.8 seconds

German Shepherd: Can you?

NO TRESPASSING