# DISCUSSION – STATISTICAL THINKING IN DOD T&E

## STATISTICAL ENGINEERING SUMMIT

JK Analytics
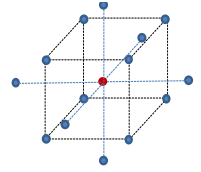
MRBM


SRBM

**FIND – IDENTFY – DESTROY**

# Exercise: SAR Map TD&E

INPUTS
(Factors)

Mission
Weather
Etc.
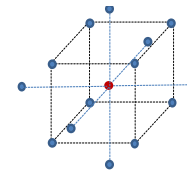
OUTPUTS
(Responses)

Aircraft Type

Terrain

**Standoff (Risk)**

**Target Mobility**

Map Resolution

**PROCESS:**

**Find and ID SAM Launchers**
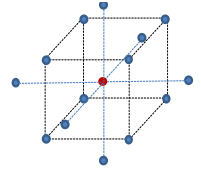
Time to ID

Correct ID %

Noise

**\* Bold are Hard-to-change Factors**

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# Becoming the Experts
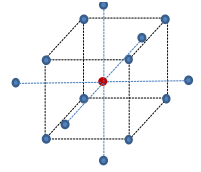## Picking the Right Team

- **Intelligence Officer**
    - **Determine what they want us to do**

- **Lead Operational Analyst (OA)**
    - **Determine what we *can* do**

- **Lead Unit Project Officer (UPO)**
    - **Determine *when* we can do it**

- **Project Manager Assistant (PMA)**
    - **Track the test *process***

| INTEL (Problem) | OA (Capability) |
|---|---|
| UPO (Timeline) | PMA (Process) |

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## OA vs. UPO

| 4 | X | 3 | X | 3 | X | 2 | X | 2 | = | 144 |
|---|---|---|---|---|---|---|---|---|---|---|
| Aircraft | | Cue Size | | Environment | | Risk Level | | Mobility | | Runs |

## Split-Plot Design

| 4 | X | 3 | X | 3 | X | 2 | X | 2 | = | 48 |
|---|---|---|---|---|---|---|---|---|---|---|
| Aircraft | | Cue Size | | Environment | | Risk Level | | Mobility | | Runs |

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# A Split-Plot Design



**LOW RISK**

# Setup Challenges



**MRBM**

**x 3**



**SRBM**

**x 10**
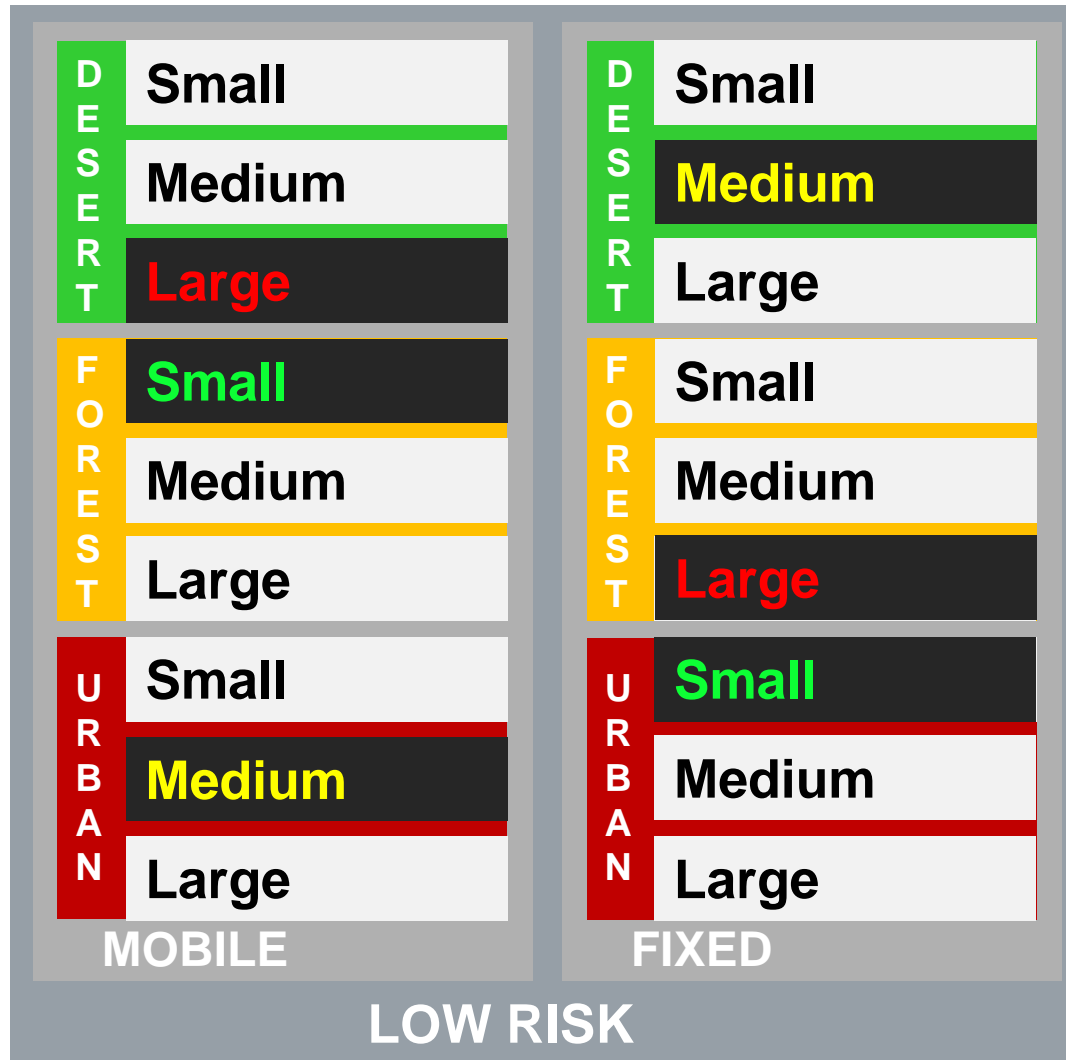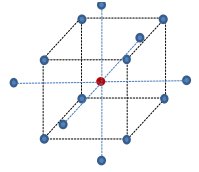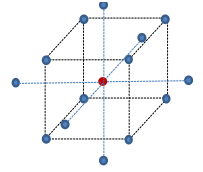
**3 Weeks…**
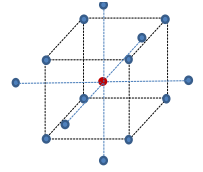
# "NO!"

# "NO"

## "Okay, but it will cost $800,000"
## "Just kidding, make that $3,000,000"

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# Setup Challenges
## Victory!
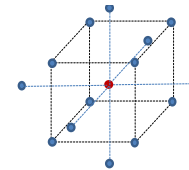
# Execution Challenges
## "Natural" Causes
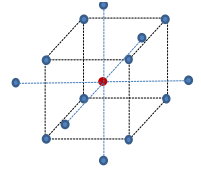
| | | | |
|---|---|---|---|
| ~~DAY 1:~~ | ~~LOW RISK~~ | ~~FIXED TARGETS~~ | → |
| ~~DAY 2:~~ | ~~LOW RISK~~ | ~~MOBILE TARGETS~~ | → |
| DAY 3: | HIGH RISK | FIXED TARGETS | |
| DAY 4: | HIGH RISK | MOBILE TARGETS | |
| DAY 5: | BACKUP | | |

**WEATHER CANCEL**

**POTUS CANCEL**

*"Plans are worthless… But Planning is everything."*
**- Dwight D. Eisenhower**

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# Reporting
## The Right Display



**OVERALL RESULTS**

TIME

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| High | Low | High | Low | High | Low | High | Low | High | Low | High | Low |
| **Desert** | | **Forest** | | **Urban** | | **Desert** | | **Forest** | | **Urban** | |
| **Fixed** | | | | | | **Mobile** | | | | | |

**VARIABLES**

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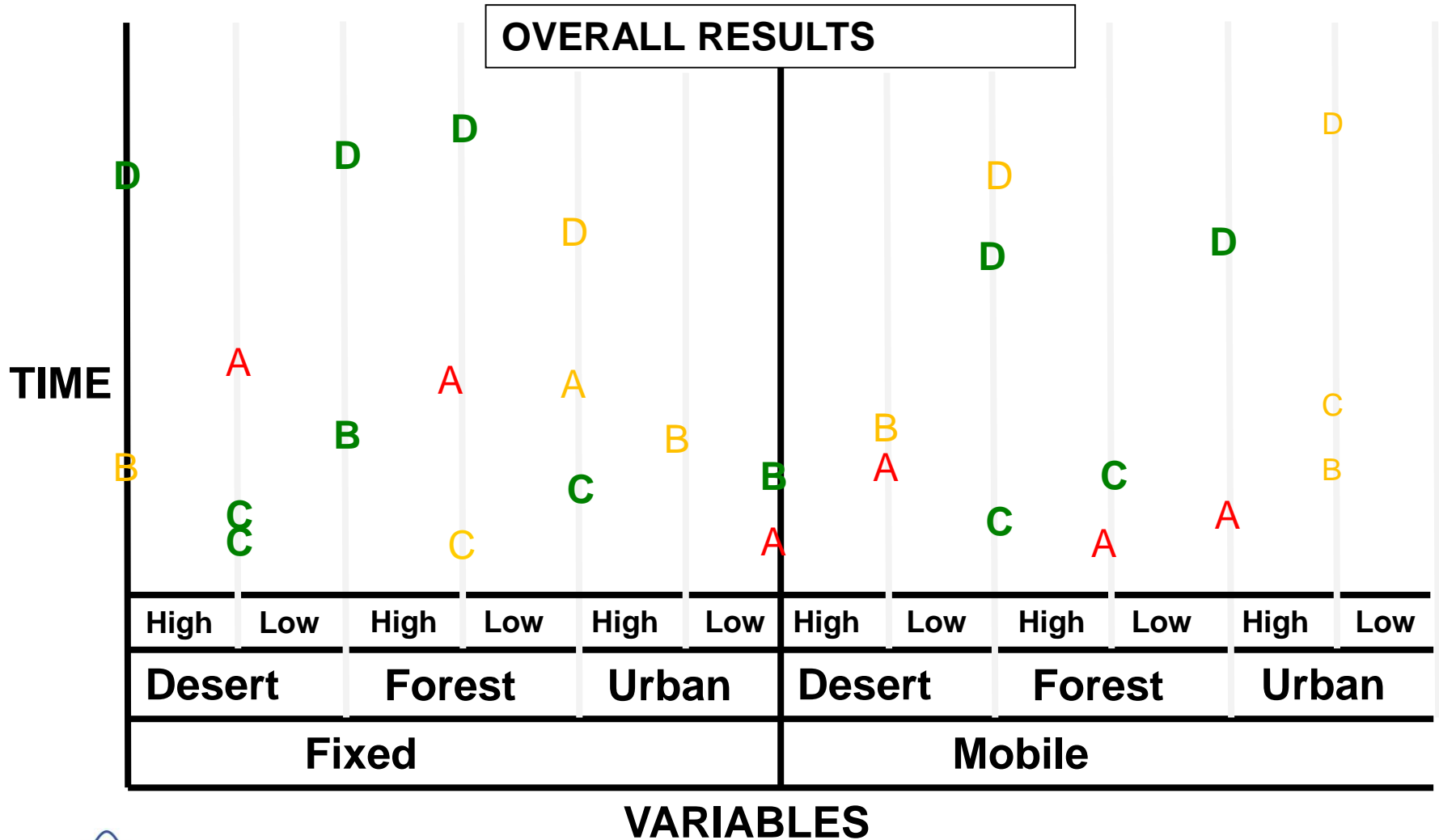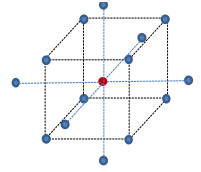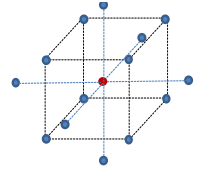
# Results

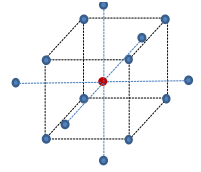- Accomplished all test objectives and reported 4 months early

- Spent $322,000 instead of $3,300,000

- Created 3 MRBMs for future use


- Developed tactics for use in combat

- Developed training plans to prepare crews

- Modified 1 MDS with 2 new systems since publishing


- Briefed CSAF, A3, N3, and Chief of Info Dominance to comprehension

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# Statistical Engineering Improvement Areas

- Flexible problem-solving capability
  - Understanding the primary goals / objectives of the study
  - Knowing the restrictions, limitations and time/budget constraints
  - Adapting perfect application of methods to fit the reality of the situation – what are the best compromises?

- Statistical leadership and collaboration
  - Right kinds of skill/experience/personalities in leverage positions

- Sufficient number of practitioner SE's in the right places
  - Not just traditional statisticians, data scientists, but prob. solvers

- Clearly defined planning process and facilitation expertise
  - Taking the time needed to understand the problem and generate a viable plan for effective solution