Value Focused Thinking: Guiding C2 System Interface Design

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Agenda

• Problem Statement
• Value-focused Thinking (VFT) Basics
• VFT Applied to Intel Analysts - Usability
• Application to C2 - Usefulness
Problem

- Battlefield commanders are demanding
  - Right information at the right time in the right way…..

- Interfaces can be viewed as work aids
  - Users’ critical functions must be addressed

- Developers always have resource constraints

- Need framework to guide development
VFT Basics

• The VFT approach emphasizes values as the driving force behind decisions:
  – Evaluates how well alternatives achieve those values
  – Allows the incorporation of intangible concepts into the decision-making process
  – Provides a defendable process
  – Adds some objectivity to a generally subjective process
Benefits of VFT

THINKING ABOUT VALUES

- Uncovering Hidden Objectives
- Identifying Decision Opportunities
- Creating Alternatives
- Interconnecting Decisions
- Evaluating Alternatives
- Guiding Strategic Thinking
- Facilitating Involvement in Multiple-Stakeholder Decisions
- Guiding Information Collection
- Improving Communication

(Keeney)
10 Steps

1. Define Problem
2. Build Hierarchy
3. Identify Evaluation Measures
4. Establish Evaluation Functions
5. Weighting
6. Choose Alternatives to Evaluate
7. Score Alternatives
8. Deterministic Analysis
9. Sensitivity Analysis
10. Analyze Conclusions
VFT with Intel Analysts

What is Valued in Software Interface for a Complex, Analytic Domain?

1st Tier

Input
  - Input Simplicity
  - Intuitive Feel

Processing
  - Presentation
  - Engine Process

Output
  - Delivery
  - User Control
  - Intuitive Feel

2nd Tier
VFT with Intel Analysts

What is Valued in Software Interface for a Complex, Analytic Domain?

1st Tier

Input (.35)  Processing (.3)  Output (.35)

Input Simplicity  Intuitive Feel  Presentation

2nd Tier

Engine Process  User Control

Delivery  Intuitive Feel

Presentation
What is Valued in Software Interface for a Complex, Analytic Domain?

1st Tier

- Input (.35)
  - Input Simplicity (.4)
  - Intuitive Feel (.4)
  - Presentation (.3)
  - Engine Process (.25)

- Processing (.3)
  - Presentation (.3)

- Output (.35)
  - Delivery (.3)
  - Intuitive Feel (.3)
  - Presentation (.35)

2nd Tier

- User Control (.45)
VFT with Intel Analysts

What is Valued in Software Interface for a Complex, Analytic Domain?

- Input (.35)
  - Simplicity (.4)
    - Assistance (.35)
      - Directed (.6)
        - Extent that they have directed input (1)
    - Forgiveness (.35)
  - Efficiency (.3)
    - Interpretation (.4)

Score:
0 - None/Little
.3 - Limited
.7 - Some
1 - Majority
Application to C2

What is important to represent to provide C2 Situational Awareness?

• Past, current and potential future operational picture
• Campaign plan
  • Current plan
  • Status of plan
  • Issues -> Existing and anticipated
• Historical data
  • Lessons learned, previous campaign Commander’s Intent, baseline or previous
• Military battlespace
  • Logistics, infrastructure, public affairs, comms, weather
• Relevant non-military battlespace
  • Political, economic, social, information
• Temporal, spatial, virtual data
Application to C2

What is important to represent to provide C2 Situational Awareness?

- **Environment**
  - Weather
  - Atmospheric
  - Astronomical
  - Infrastructure
  - Terrain/Hydrography

- **Friendly**
  - Location
  - Capability
  - Identification
  - Activity/Posture
  - Missions, Plans & Directives

- **Adversary**
  - Location
  - Capability
  - Identification
  - Activity/Posture
  - Missions, Plans & Directives

- **Neutral/Unknown**
  - Location
  - Capability
  - Identification
  - Activity/Posture
  - Missions, Plans & Directives

Alternative branches: PMESII
(Political, Military Economic, Social, Information, Infrastructure)
Application to C2

What is important to represent to provide C2 Situational Awareness?

- Environment
- Friendly
- Adversary
- Neutral/Unknown

Possible Timely Scores:
- 0  - 48 hours < t
- .1 - 24 hours < t < 48 hours
- .3 - 12 hours < t < 24 hours
- .5 - 2 hours < t < 12 hours
- .7 - 30 minutes < t < 2 hours
- .9 - t < 30 minutes
- 1  - Real Time
Discussion

• Usability
  – The interface capability VFT hierarchy valuable for usability
  – Can be vetted through lower-end users

• Usefulness
  – Needs to vetted through decision makers
  – Challenge: Merging all relevant input
  – The final C2 VFT Hierarchy will be extensive
  – Complementary to other knowledge elicitation methods