Value Focused Thinking: Guiding C2 System Interface Design

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Dr. Janet E. Miller

Cognitive Systems Engineer

Human Effectiveness Directorate

Air Force Research Laboratory

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**
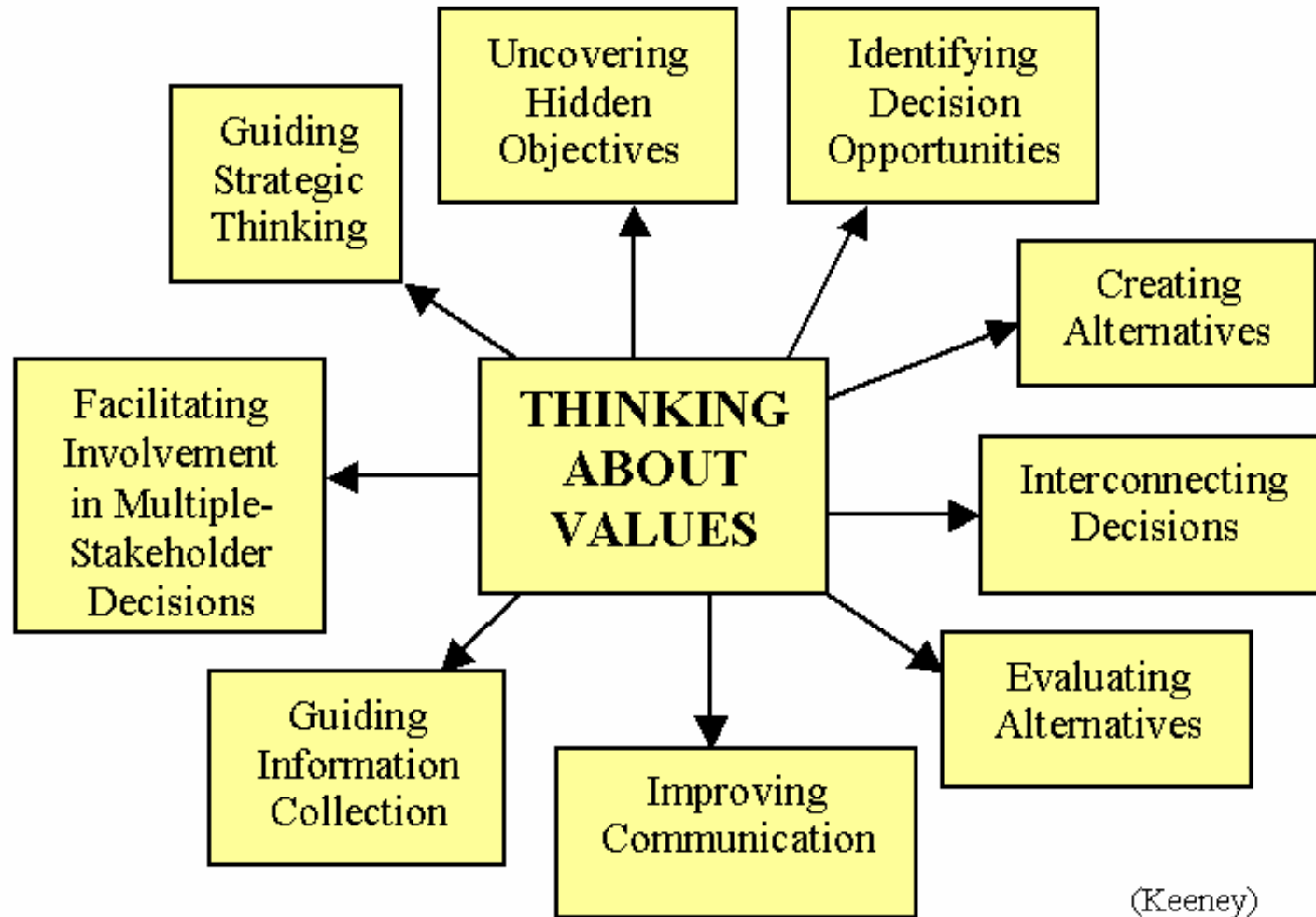
- **Need framework to guide development**

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**

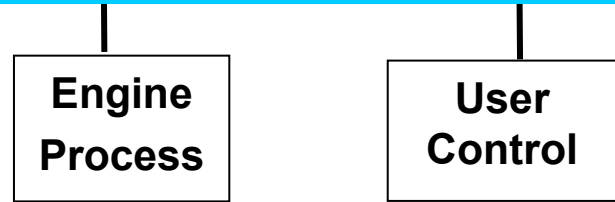 - **Adds some objectivity to a generally subjective process**

Benefits of VFT

Uncovering Hidden Objectives

Identifying Decision Opportunities

Guiding Strategic Thinking

Creating Alternatives

Facilitating Involvement in Multiple-Stakeholder Decisions

THINKING ABOUT VALUES

Interconnecting Decisions

Guiding Information Collection

Improving Communication
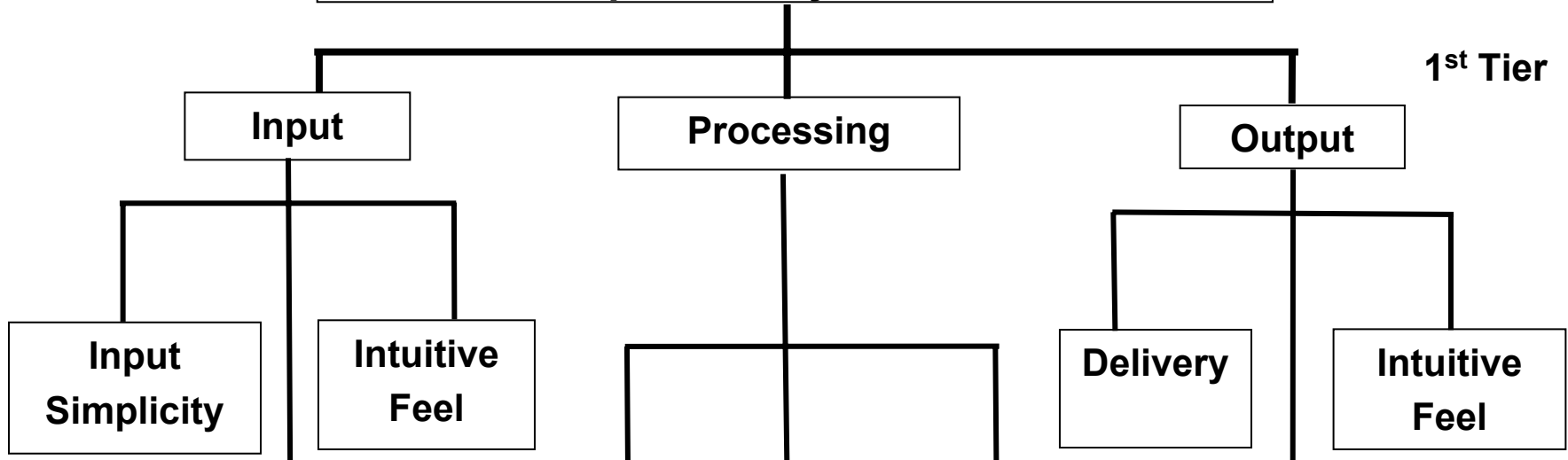
Evaluating Alternatives

(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**
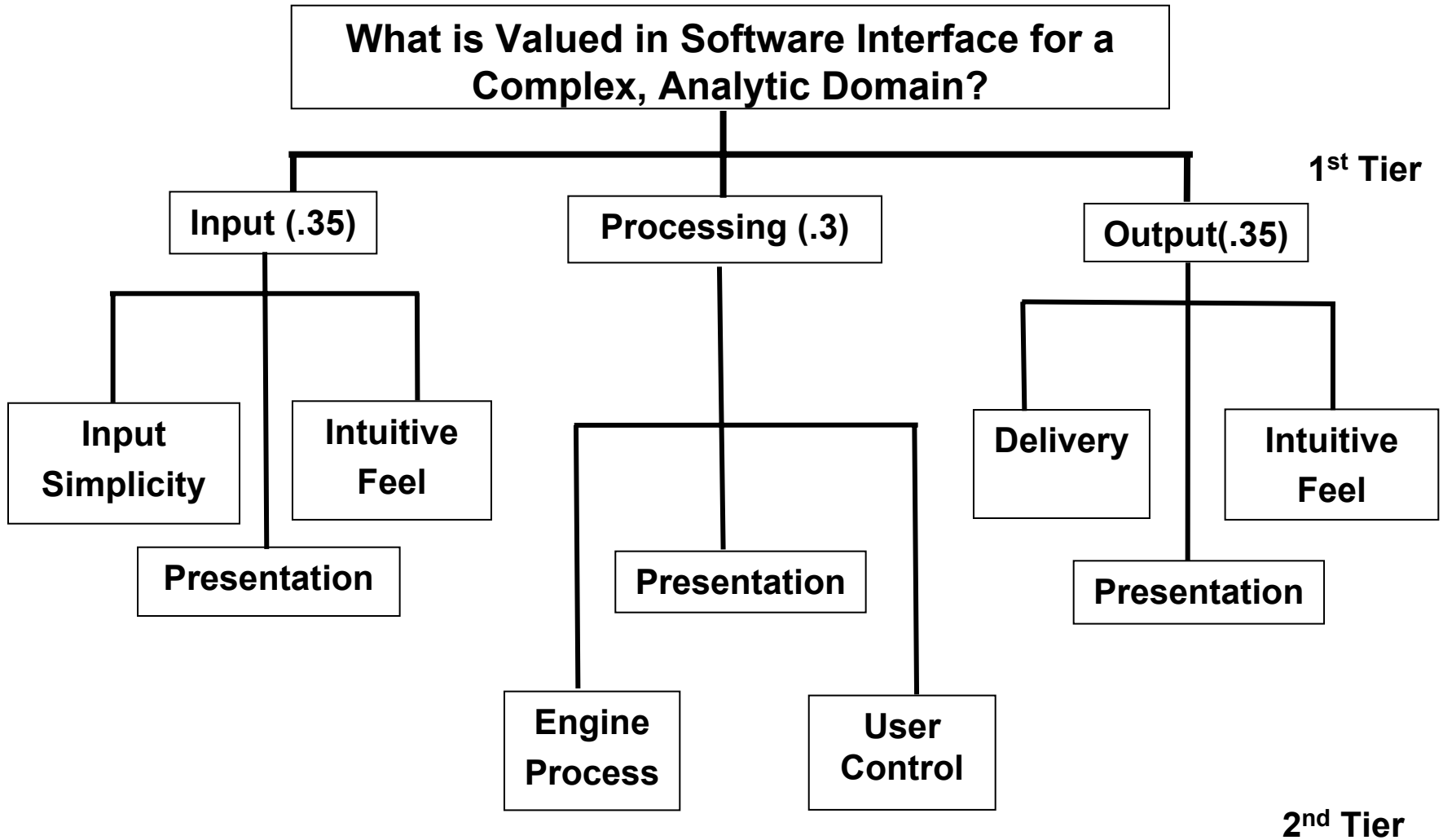10. **Analyze Conclusions**

VFT with Intel Analysts

What is Valued in Software Interface for a Complex, Analytic Domain?
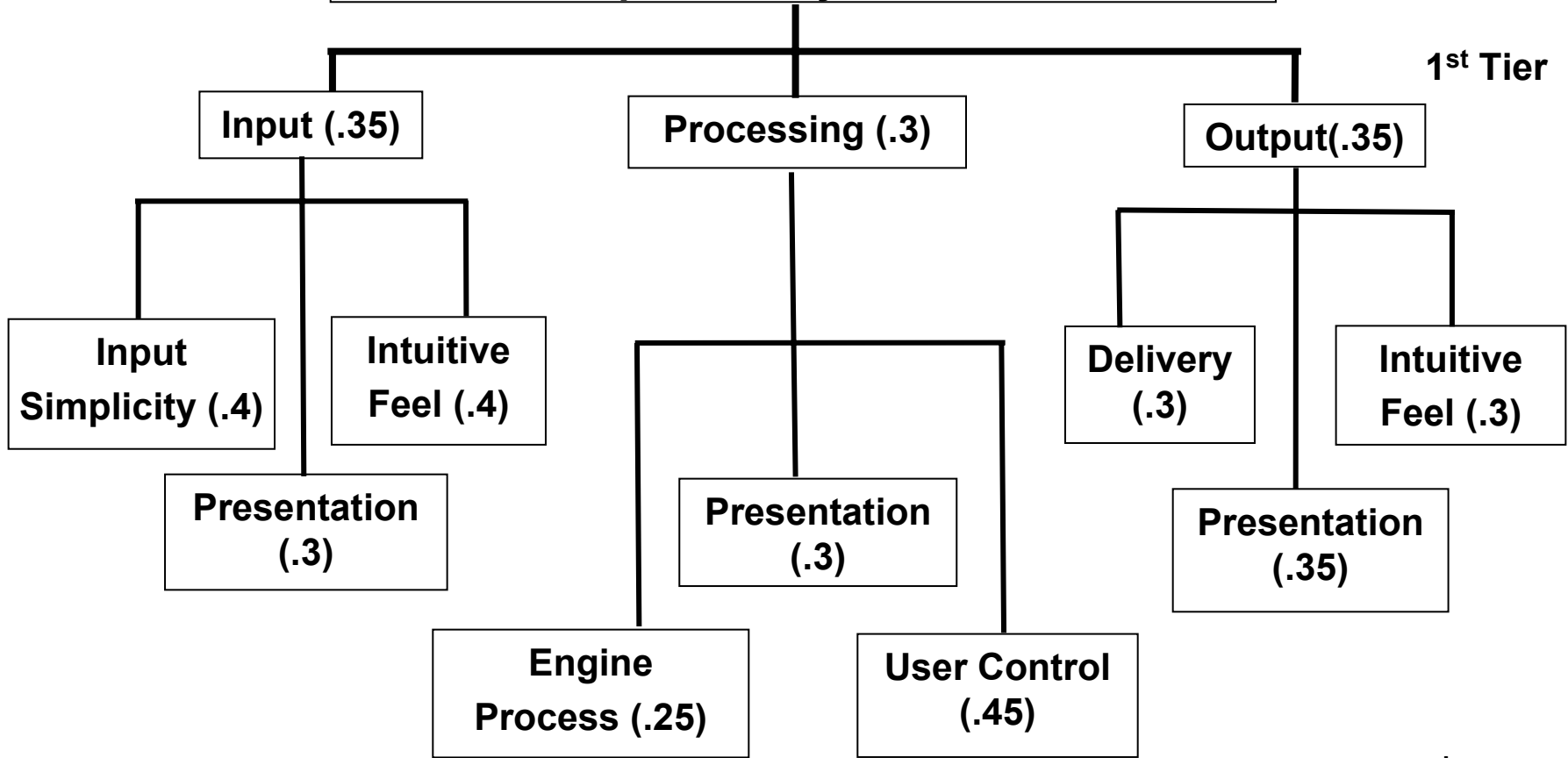
1st Tier
- Input
  - Input Simplicity
  - Intuitive Feel
- Processing
- Output
  - Delivery
  - Intuitive Feel

2nd Tier
- Engine Process
- User Control

VFT with Intel Analysts

VFT with Intel Analysts

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

- **Input (.35)**
- **Processing**
- **Output**

Input Simplicity (.4)

- **Assistance (.35)**
- **Forgiveness (.35)**
- **Efficiency (.3)**

- **Directed (.6)**
- **Interpretation (.4)**

Extent that they have directed input (1)

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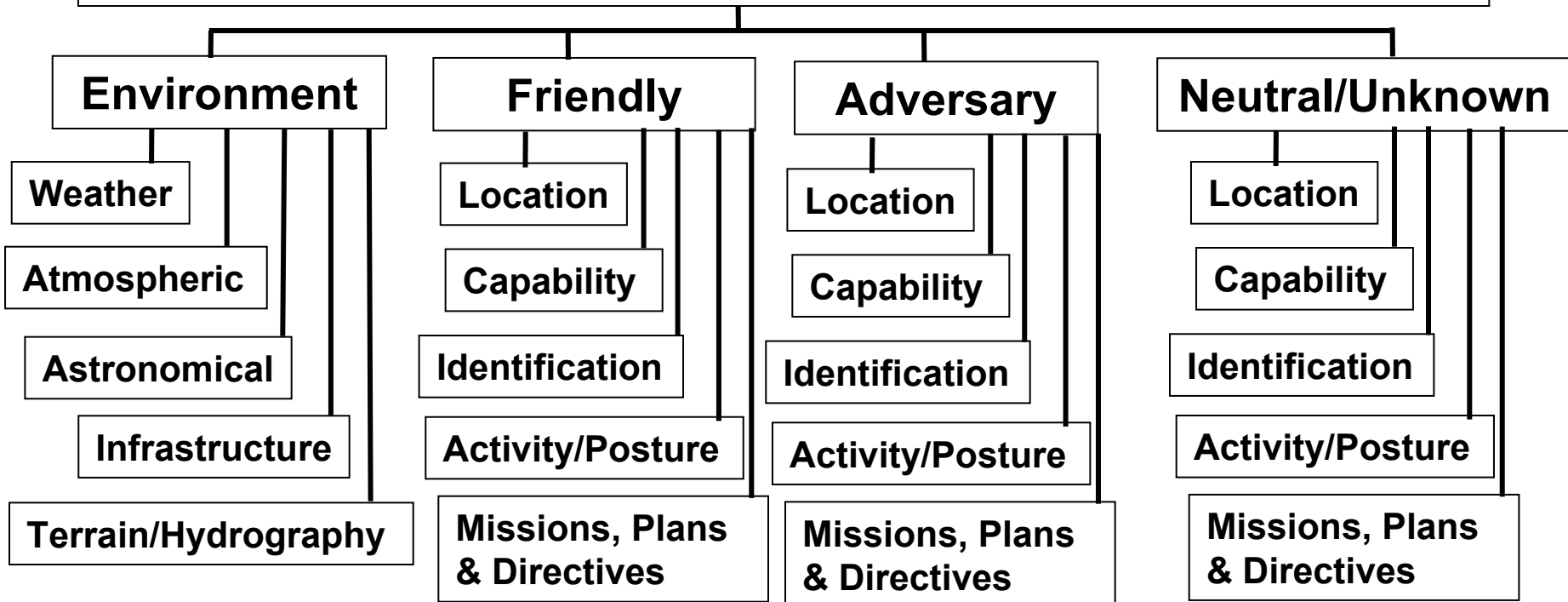- 1- Majority
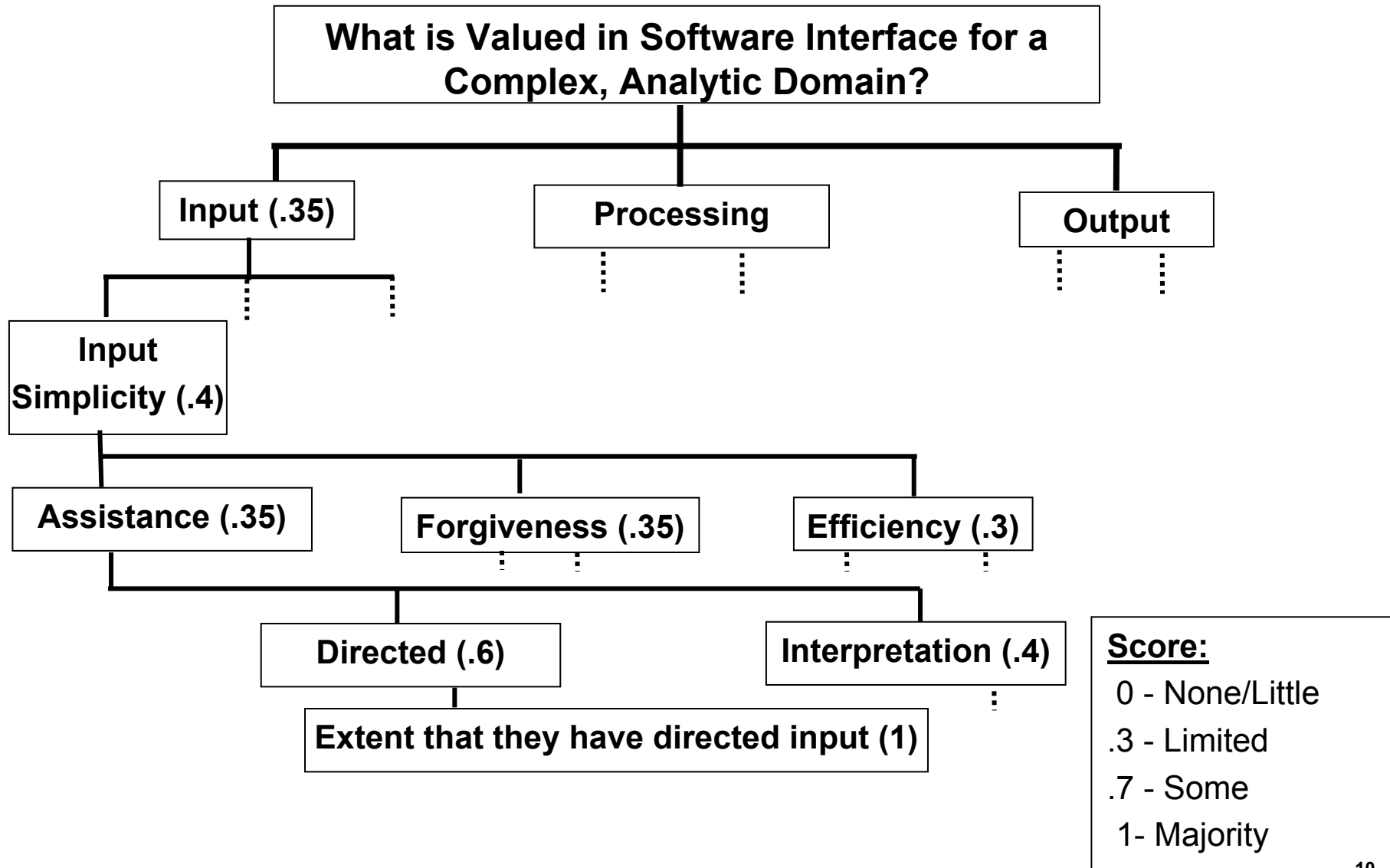
Application to C2

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
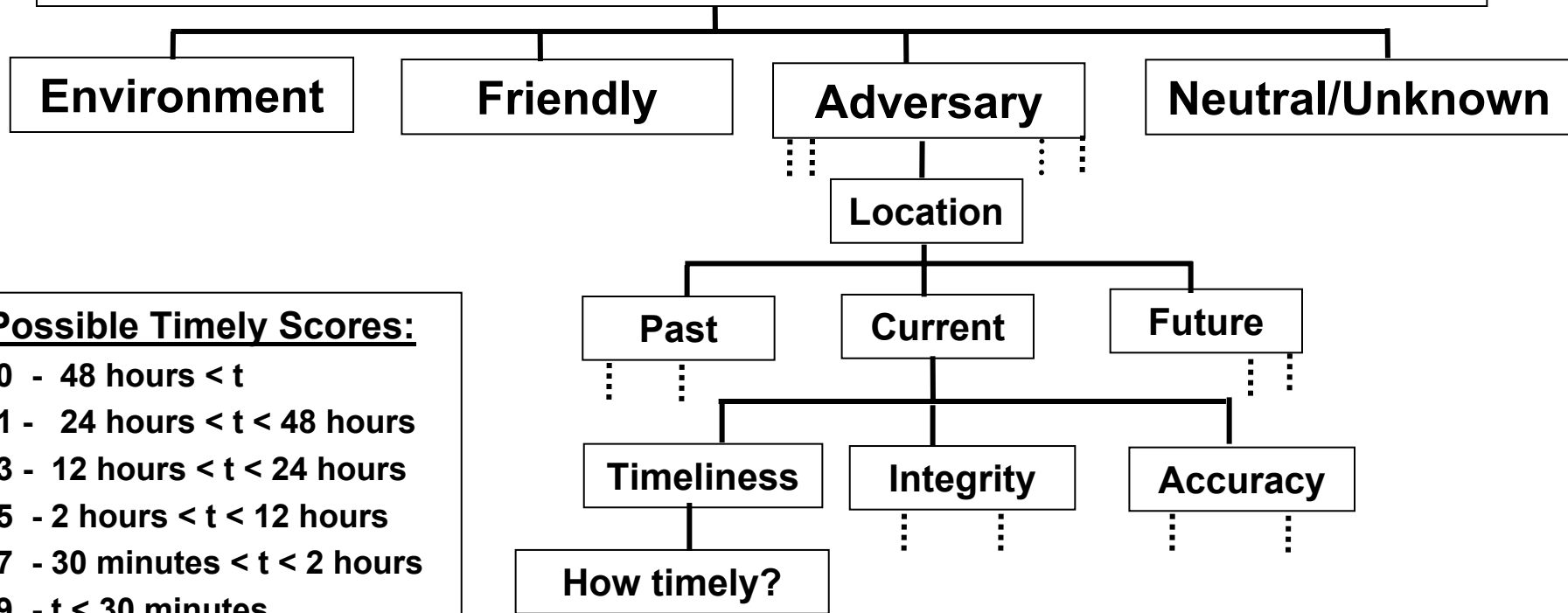C2 Situational Awareness?

Environment	Friendly	Adversary	Neutral/Unknown
Weather	Location	Location	Location
Atmospheric	Capability	Capability	Capability
Astronomical	Identification	Identification	Identification
Infrastructure	Activity/Posture	Activity/Posture	Activity/Posture
Terrain/Hydrography	Missions, Plans & Directives	Missions, Plans & Directives	Missions, Plans & Directives

Based on Joint Operational Concept for the Family of Interoperable Operational Pictures

Application to C2

What is important to represent to provide C2 Situational Awareness?

- Environment
- Friendly
- Adversary
- Neutral/Unknown

Adversary
- Location
  - Past
  - Current
    - Timeliness
      - How timely?
    - Integrity
    - Accuracy
  - Future

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

Based on Joint Operational Concept for the Family of Interoperable Operational Pictures

Discussion

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

- **Usefulness**
  - **Needs to vetted through decision makers**
  - **Based on existing documentation so gives valid starting point**
  - **Challenge: Merging all relevant input**
  - **The final C2 VFT Hierarchy will be extensive**
  - **Complementary to other knowledge elicitation methods**