Distributed Holistic Bounding

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Problem

- **Analyzing the performance of large, scale-free systems**
  - Changing boundaries
  - Changing components
  - Nebulous system objectives (Information Superiority)

The GiG & Information Superiority

- **Global Information Grid (GIG): a large, scale free system "designed" to meet a specific objective (Information Superiority)**
- **The GiG consists of a constantly changing number of nodes and links**
- **Information Superiority is a measure of one's own information capabilities against those of an enemy (another constantly changing area)**

Feedback

- **Accomplishing effective system analysis against stated objectives is irrelevant without a means of correcting poor system behavior (i.e., behavior that does not produce desired outcomes)**
- **Feedback must be considered a part of the system under study**

Bounding the Problem

- **The GiG, by definition, is a global system; much too large to analyze as a whole**

- **A concept should be developed for parsing the GiG into adequately small segments for study, but adequately large segments to still have meaning in assessing Information Superiority**

Parsing the GiG

- Through understanding ***stakeholder influences*** (Rowley 1977) and ***network cliques*** (Provan and Sebastian 1998) we can identify “unique” systems within the GiG that have specific network roles in gaining Information Superiority

- Studying the nature of stakeholders and cliques and ***the strength of the ties*** between them (Granovetter 1973) gives us a layout of information systems within the GiG that contribute to overall system performance for specific operations

System Identification

- **Specific, desired outcome**
  - Contraband identification on inbound shipping
  - Lawrence Livermore National Labs/TacSAT
- **Stakeholders in process**
  - Boarding Party
  - USCG Commander
  - Expert Personnel
- **Stakeholder information needs**
- **Feedback mechanisms within the system**
- **System success criteria (determined by the on-scene commander)**

Bound the system

- **Based on the commanders criteria for success**
- **Components affecting information critical to these criteria are considered within the system (strongly tied to the outcome)**
- **Components affecting information that is ‘nice-to-have’ should be considered outside the system (loosely tied to the outcome)**

Distributed Holistic Bounding

- **This method of bounding the LLNL/TacSAT system strives to treat this system holistically (i.e., identifying information and systems that are critical or non-critical its functionality. From here the system can be assessed/managed based on the potential debilitating effect of the environmental changes within and without of the system)**

- **Further assessment of systems and information that affect the performance (but not critically) of the LLNL/TacSAT should reveal the other systems that contribute to the performance of the LLNL/TacSAT but have their own critical function within the GiG.**

Distributed Holistic Bounding

- **By treating each of the strongly tied systems as holistic entities linked to each other through weak ties we can begin to develop models that help determine how well a large, scale-free system (such as the GiG) is meeting its objectives (information superiority) and aid in identifying areas where efficiency or effectiveness may not be optimal.**

- **I call this Distributed Holistic Bounding**