



DRAFT

Dynamic Conceptual Mapping Applied to Military Planning

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Objective

Provide a method to decompose military operations and intelligence objectives into an easily understood format using Concept Mapping techniques that additionally incorporate a level of effort weighting system.



Reduce misunderstanding of Military operation task size and complexity

- Apply a flexible visualization technique
 - render mission task dependency
 - enable mission expression without restriction
 - incorporate commander's intent with increased understanding
- Affix level of effort weights
 - convey quantified understanding of resource requirements
 - optimize deployment of assets within mission parameters
 - provide estimate of worth



Concept of Development

Concept Maps applied to military mission framework

- afford operators freedom of expression

BUT

- is hampered by an unrestrictive nature
- is not a repeatable process
- increases resource expenditure to develop information within CMAP

Research applied to Concept Maps for military planning

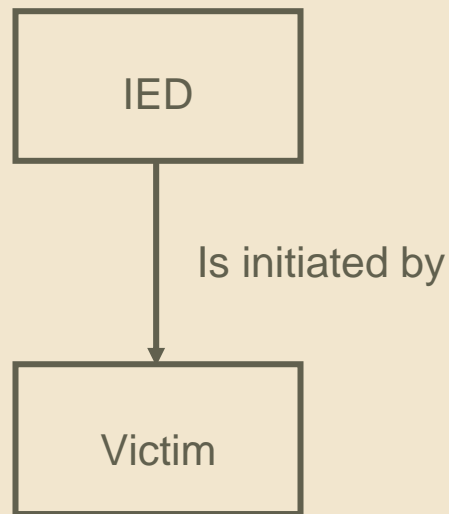
- Utilize Concept Map flexibility to capture military operations
- Convert Concept Maps into inference networks
- Apply mathematical theory of influence to develop merit-driven navigation algorithms
- Use the resulting diagrams as a planning aid for mission execution



Concept Maps Explained

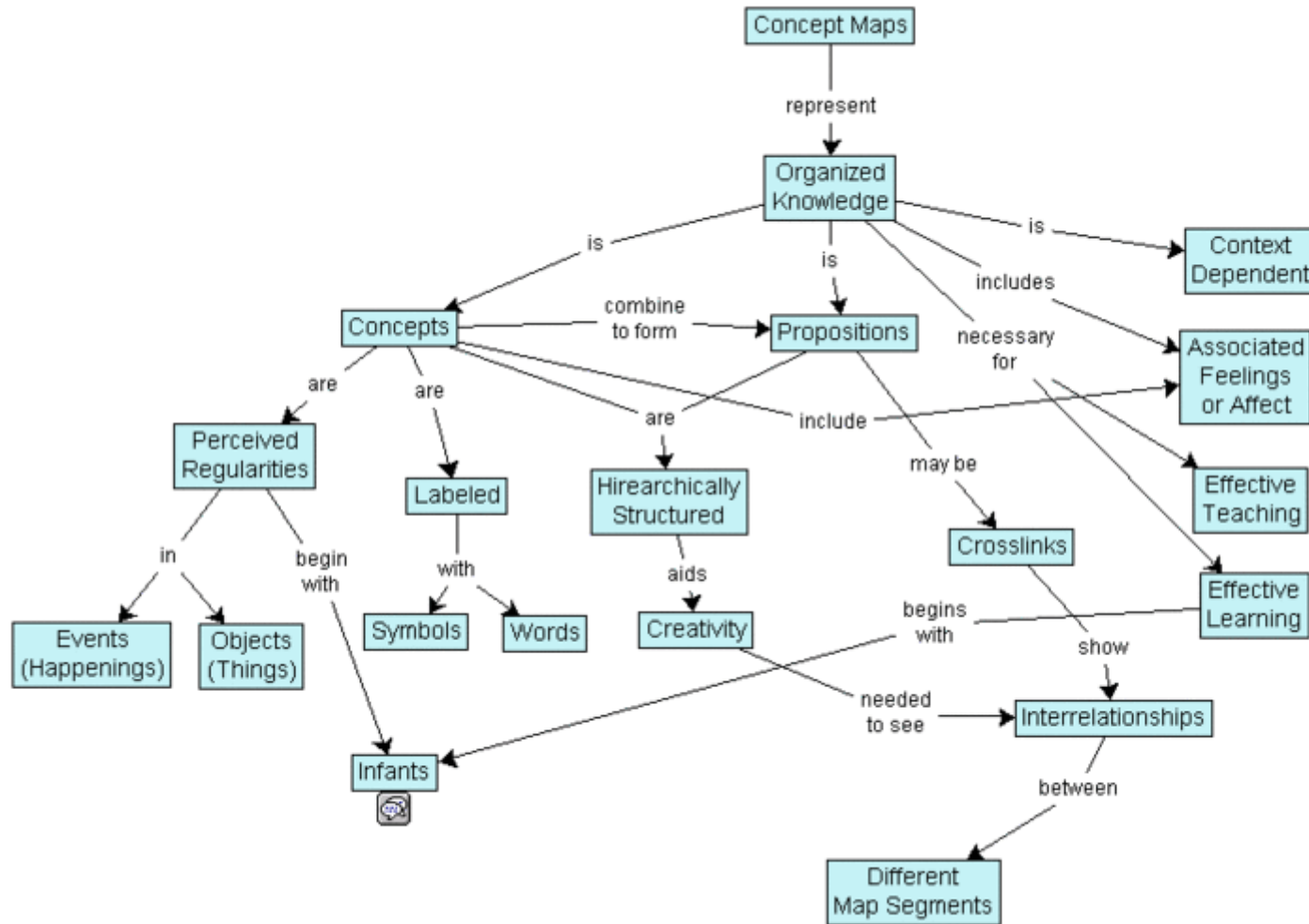
Meaningful diagrams with concept Triads $\langle A, R, B \rangle$

- A and B are two concepts (or nodes)
 - Expressed as a few words within a rectangle
- R is a relation (or link) between two nodes
 - Expressed as a few words on a directional connector





Concept Map Example



Inference Networks Explained

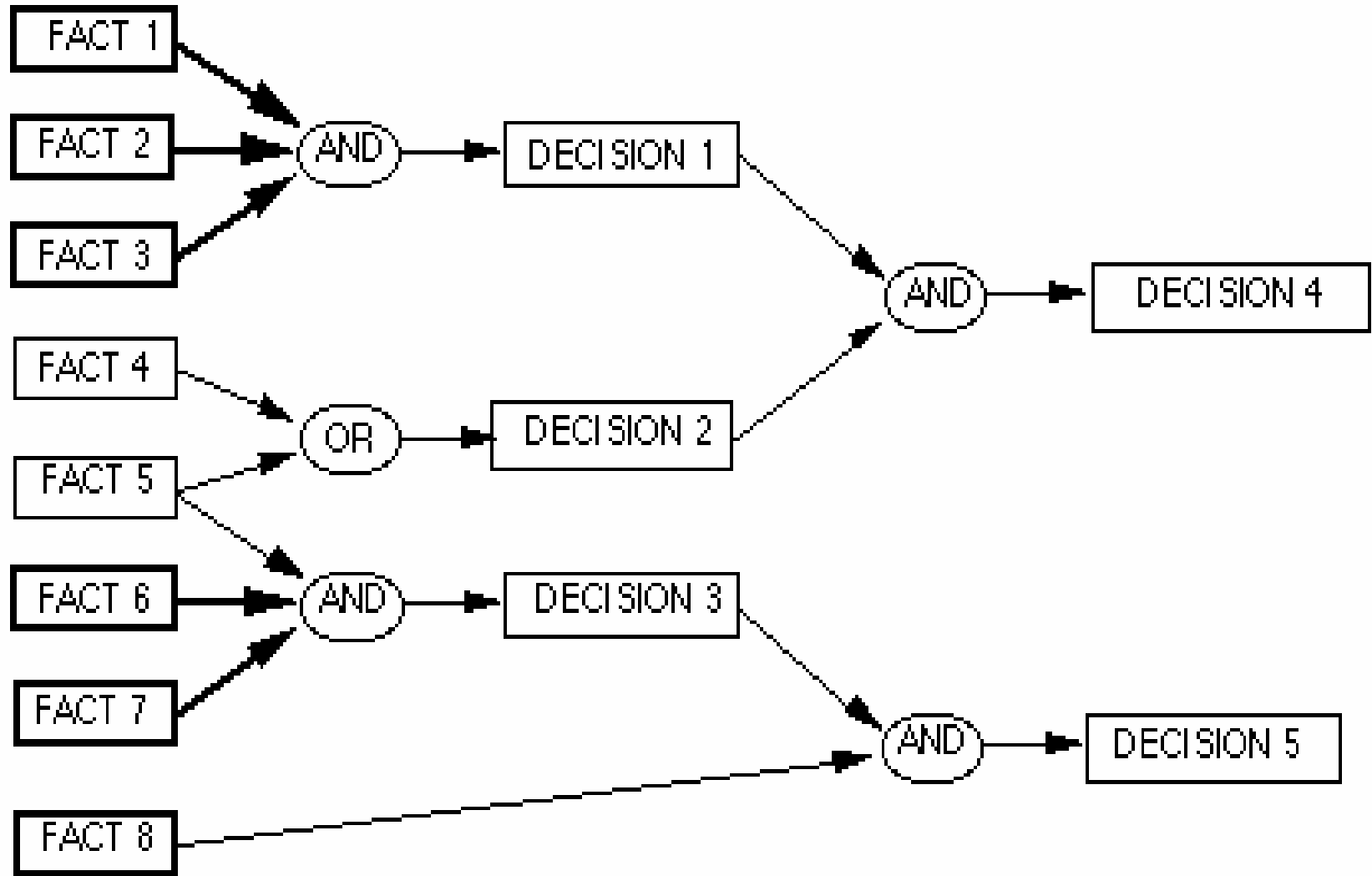


Weighted networks made of nodes and links

- nodes represent facts or propositions of germane parameters
 - facts are related in an order
 - fact value, which may change, is developed by applying the link function to the values of direct antecedent nodes
- links represent a mathematical function or rule
 - produce consequent proposition from antecedents
 - consequent value is inferred from values of antecedents
 - define Implications that enable information propagation
 - the probability of proposition authenticity



Inference Network Example





Creating Inference Networks from Cmaps

Concept Maps differ from Inference Networks

- Cmaps feature cross-links that complicate information propagation
 - Cmap nodes are not functionally derived
 - Cmap nodes are concepts not propositions

Avenues of investigation

- transform “germane” Cmap node triads into inference “propositions”
- consider Cmap structure as an inference net

Inference Net creation from Cmaps

- concentrate effort to implement second investigation avenue
- suspect a hybrid approach will include real-world tactical intelligence



Concept Maps and Inference Networks future research

- Aggregate Nodes: creation of multi-node encapsulation within a single Concept Map node
- Connected Nodes and Links: inclusion of computerized linkage, such as hyper-link connections, within nodes to enable a richer concept set



The application of Concept Mapping techniques incorporating Inference Network merit value calculations to military planning has the potential of creating a greater understanding of expected returns from asset allocation and assisting commanders in making intelligence priority requests.

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