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Digital Mission Command in the Joint Force Operations

Godin, Arkady A.; Miller, Scot A.

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Digital Mission Command (DMC) for Joint Operations

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Research focus: Pushing DMC computing of C2 aggregates from application layer into enabling infrastructure within Platform-as-a-Service

DMC foundational infrastructure is deployed at each command tier. The primary goal of C2 infrastructure is to connect hierarchically organized tiers of command. Each deployed element of C2 infrastructure uses a model of cuboids over imbedded graphoids. Each graphoid represents situations modeled as actions, which are verbs in a graph's vertex. Each world model state is described by actors as participating agents. Any action brings a movement into world model workflows. Such movements force changes in the world model's battlespace and enveloping environments. Each cube defines temporal and spatial system-of-coordinates, as well as organizational command tiers to ensure each cube is connected to its higher-level and subordinate command cubes.


Strat. Tiers

Operational Tiers

Edge Tiers

Tactical Edge Tiers

Situations Graphs with Entities Snapshot States
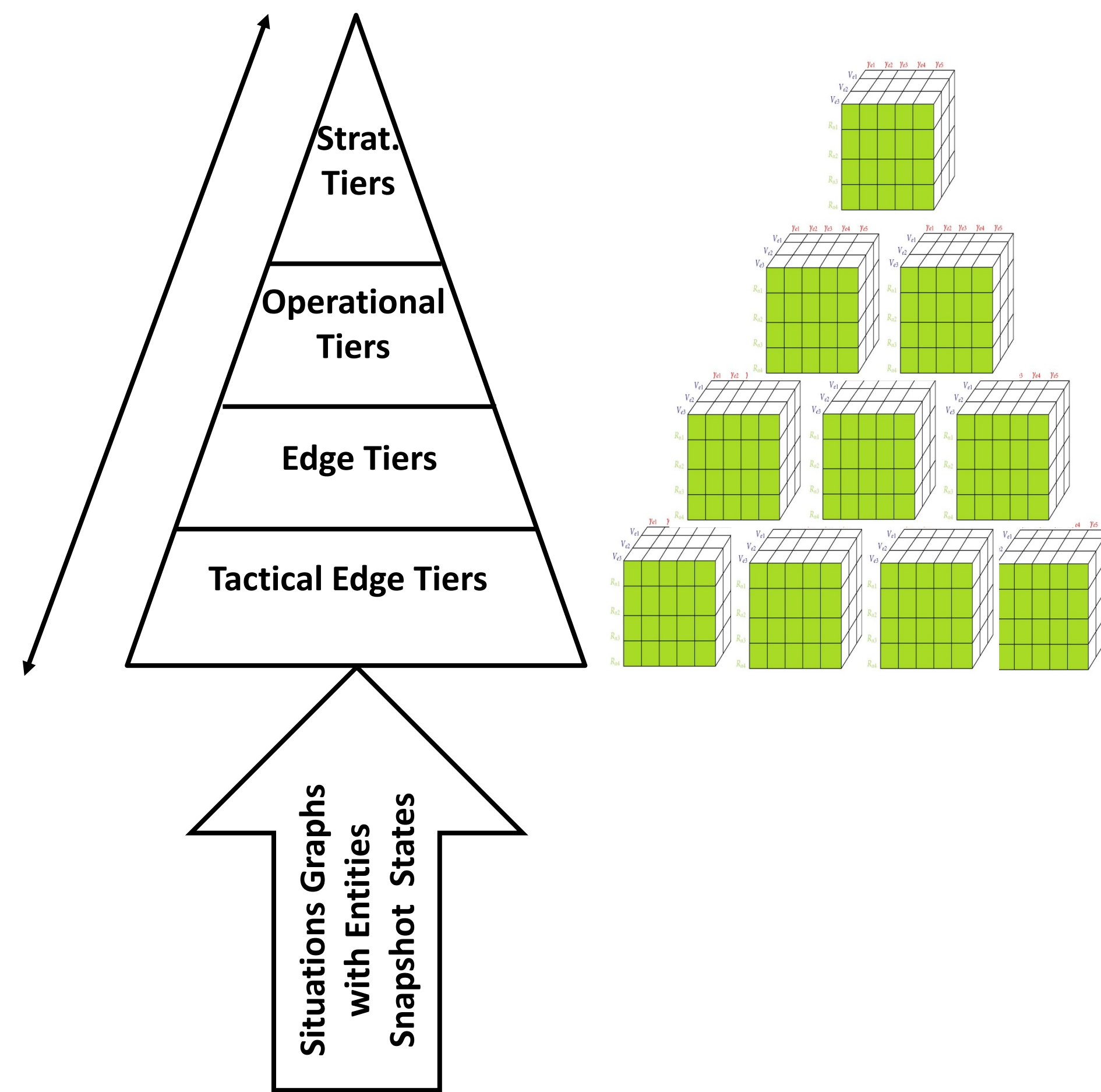
Aggregator of objects & actions in DMC

Graph, via multi-dimensional aggregation, manages laterally and hierarchically connected situations. Vertically, "situation graph" is reduced to an easily observable graph at various levels of abstraction for an Action concept. Each graph exists, therefore, exists in its own context.

Proposed Future for Digital Mission Command via Cube-Graph Knowledge Management

γ_{e1} γ_{e2} γ_{e3} γ_{e4} γ_{e5}

V_{e1} V_{e2} V_{e3}

R_{n1} R_{n2} R_{n3} R_{n4}
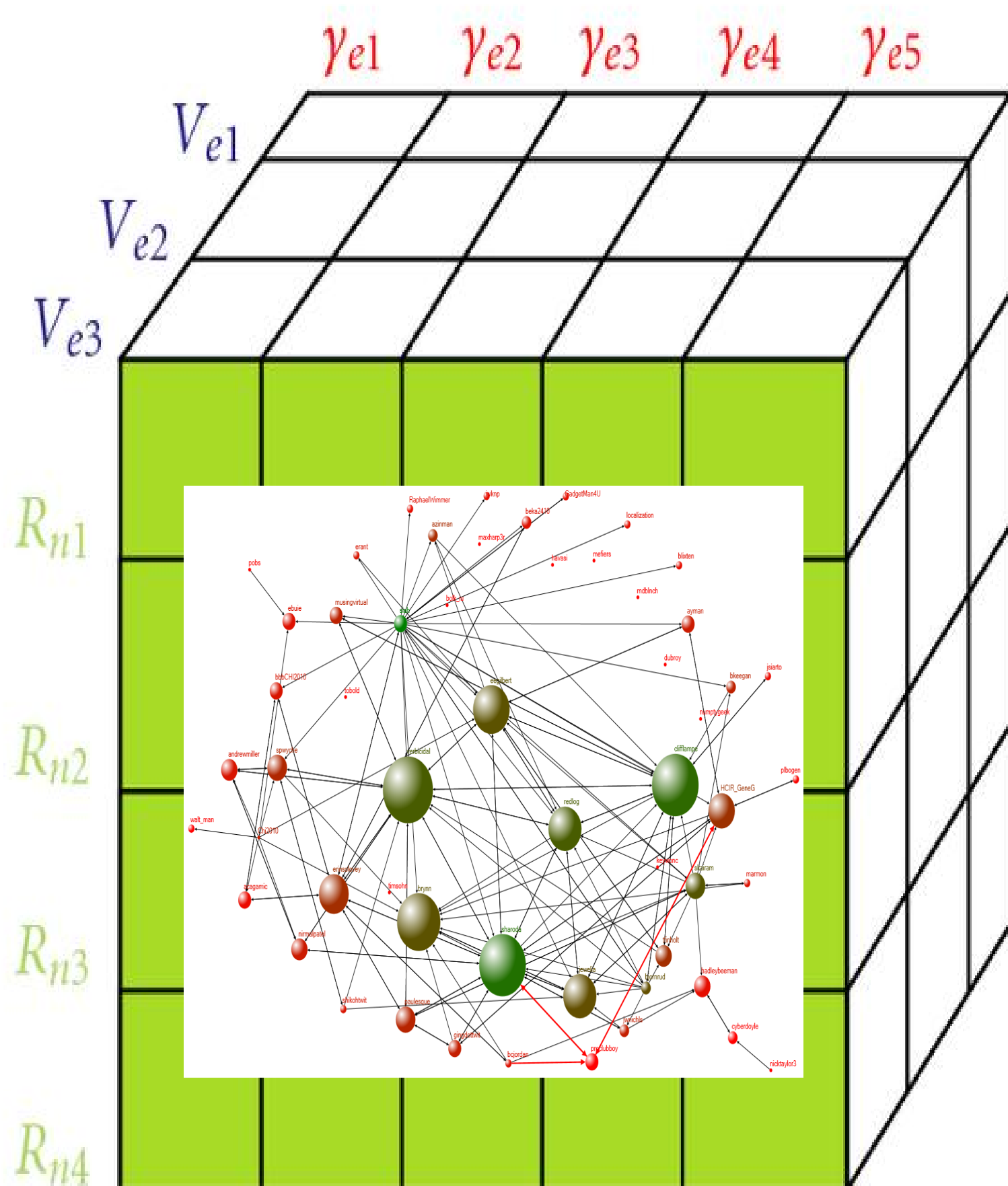
Knowledge Base (KB) is based on Action-State-Action (ASA) Graph model. "Actions" in vertices are probabilistic. States on edges are focused on objects. States change with actions executed for situations. Cube models connected ASA graphs for mission situations' actions. Info/knowledge is aggregated multi-dim & multi-hier. Info/knowledge aggregates are mapped to topological graphs via shared roles.
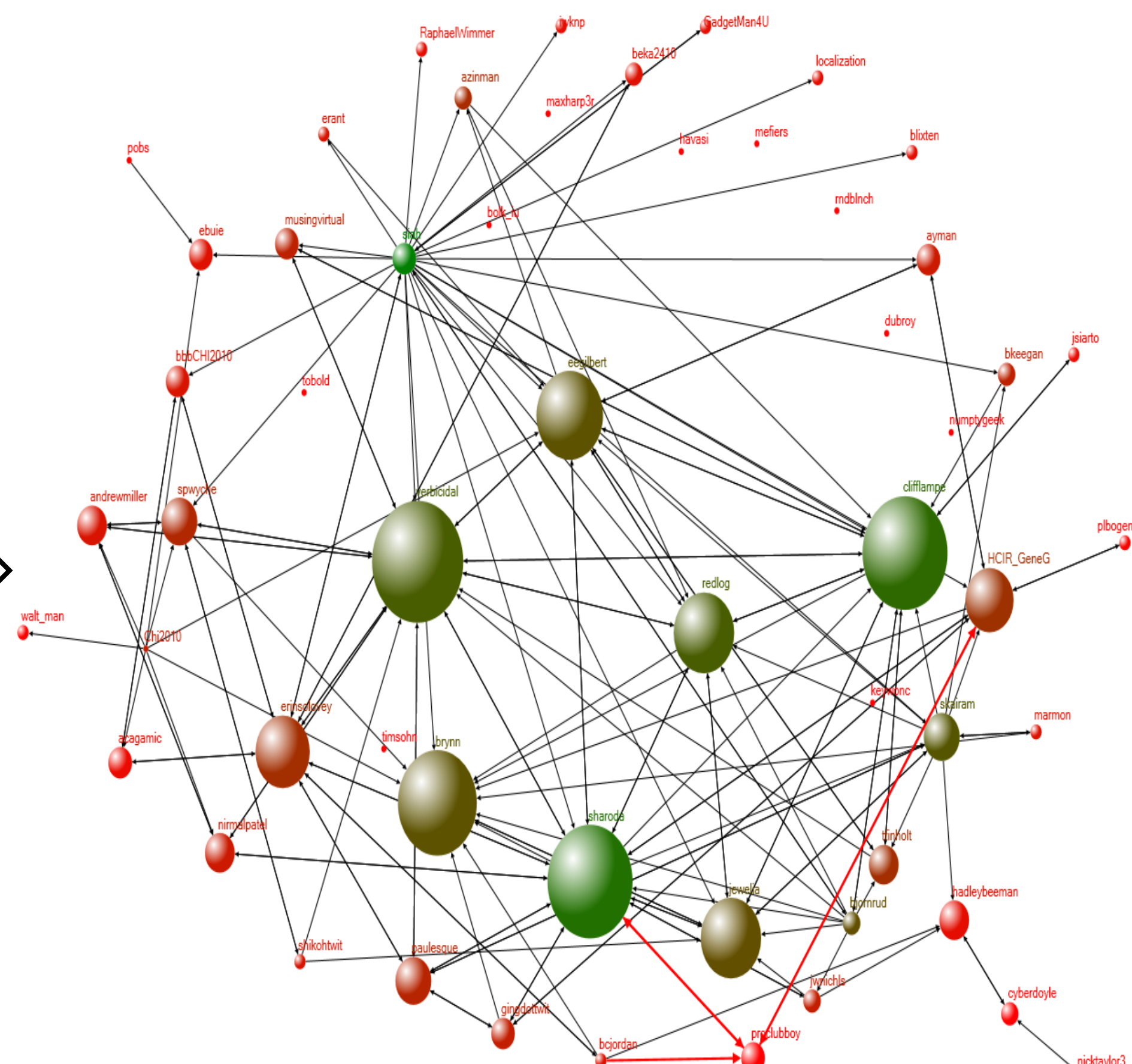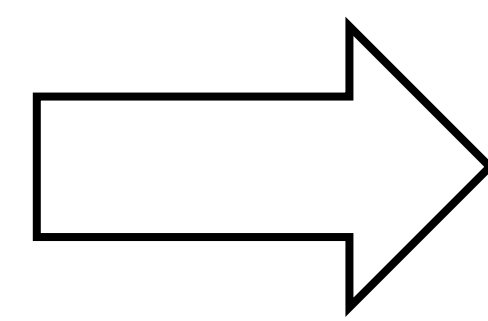
Knowledge Graph (KG) is a historical graph which is a repository of situations expressed in ASA connected triples. While KB is a near real-time live cache for run-time operations, KG captures institutional historic knowledge. It's needed for speedy and quality planning and replanning, AAR and for projecting future events based on shared historical patterns.

Researcher: Faculty Associate-Research Arkady Godin assisted by Faculty Associate-Research CAPT Scot Miller USN, (Ret.)
Graduate School of Operational and Information Sciences **Topic**
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