Leadership: A Network-based View for Competitive Advantage

Dr. Dale L. Moore

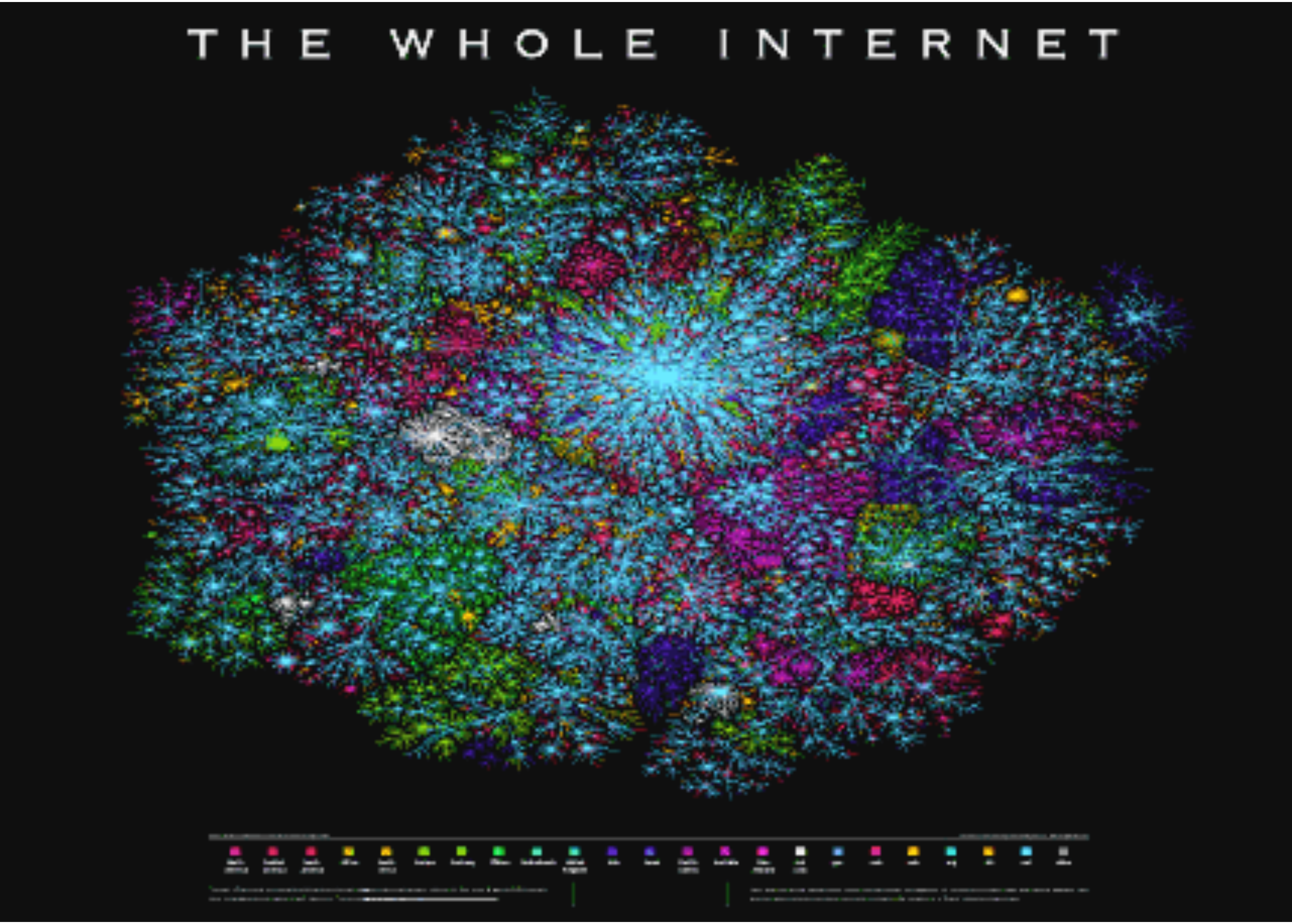
Founder and President

The Moore Group LLC

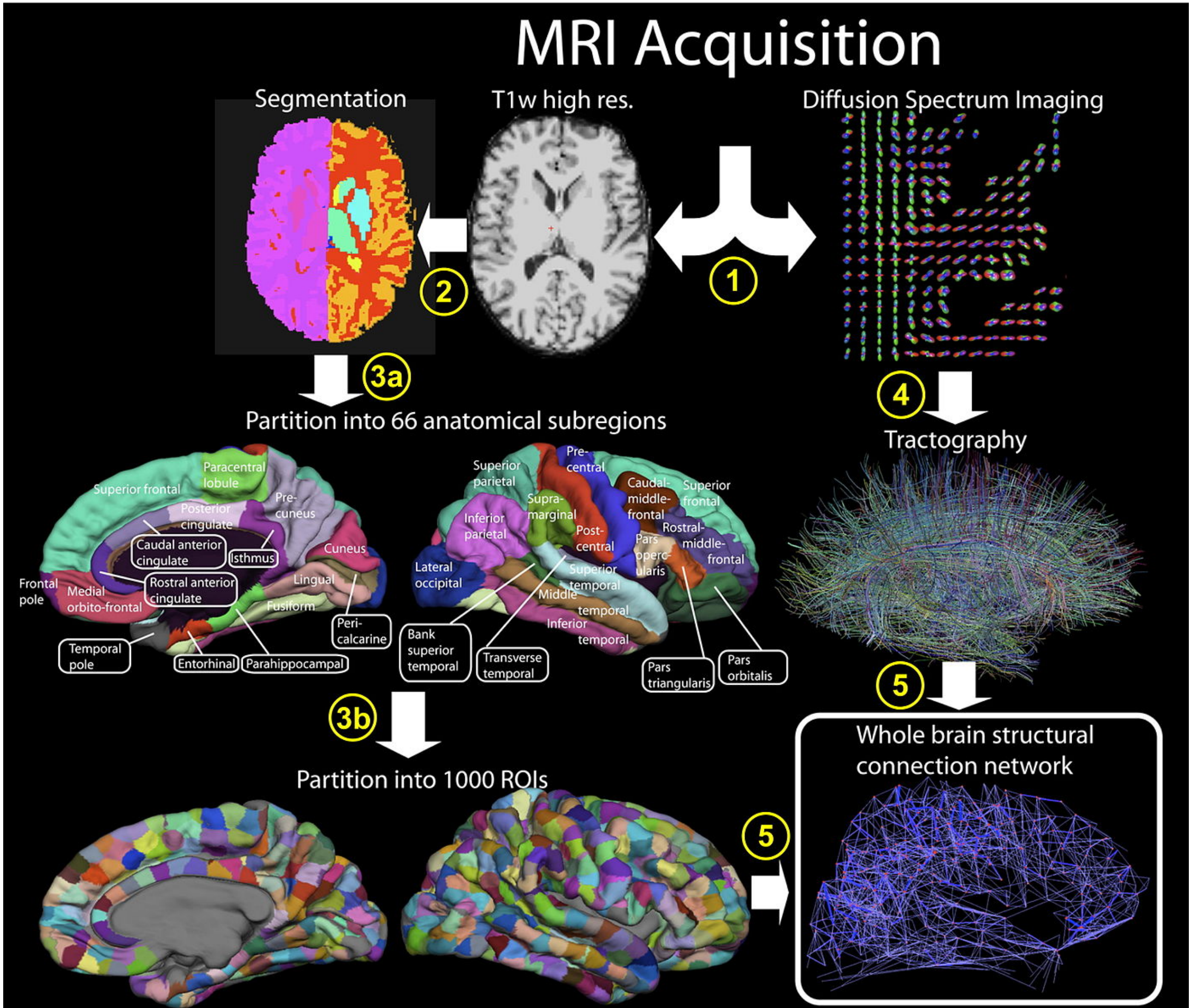
Strategy Unleashed

BLUF

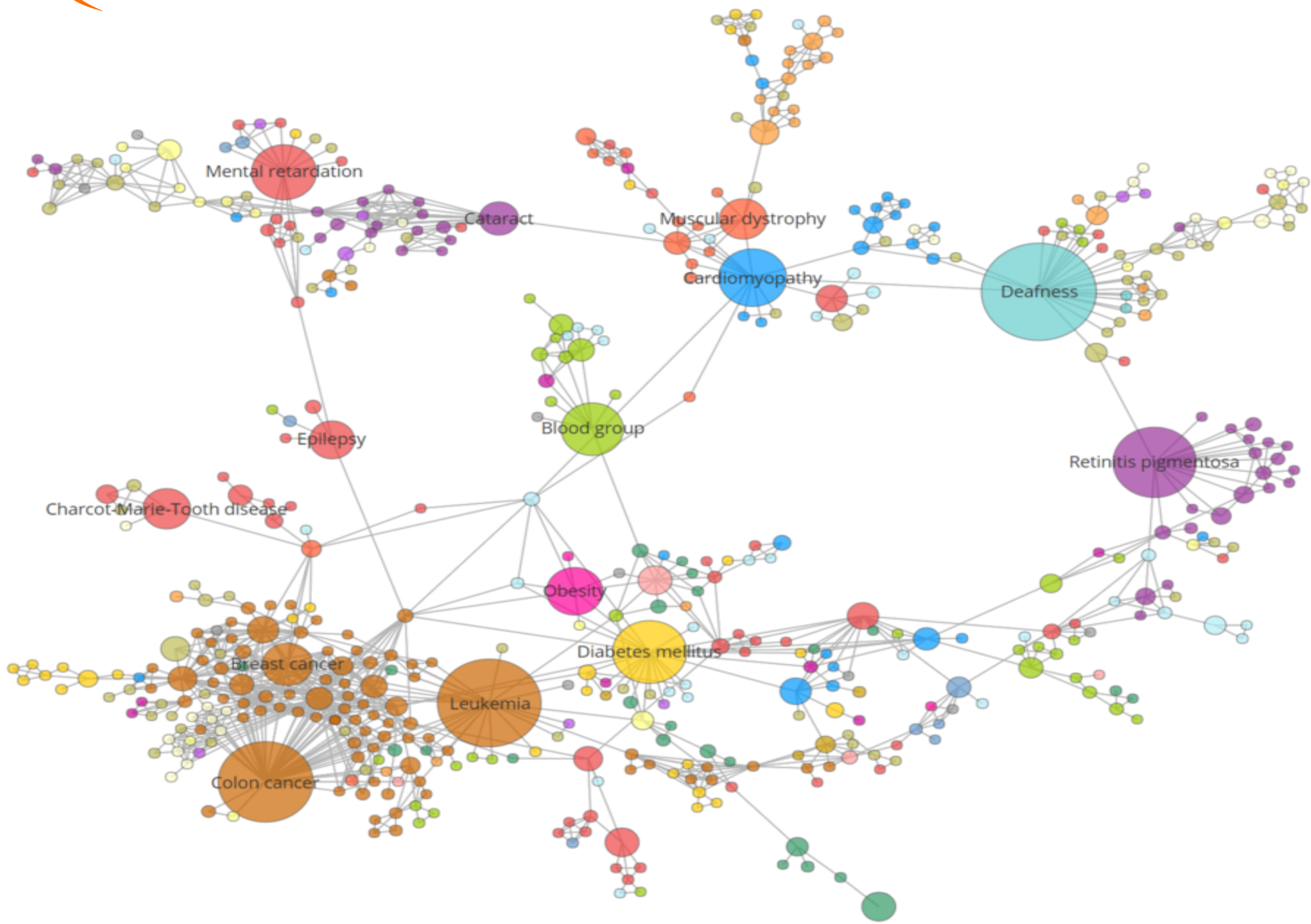
- Today, the complexity and pace of the strategic environment is growing rapidly and requires new ways to view the world.
- Leaders need new models and lenses to help them make sense and give meaning to these dynamics and their complexity.
- Network science has evolved as a powerful tool to help analyze and evaluate these complex dynamics to help leaders to see, learn, think and better understand what is really going on internal and external to their organization.
- The science of networks provides the foundations for systems thinking, big data analytics and complexity science – both of which are powerful tools in the leader's toolbox.
- Viewing the world through the lens of networks can help provide valuable insights for competitive advantage.


THE WHOLE INTERNET

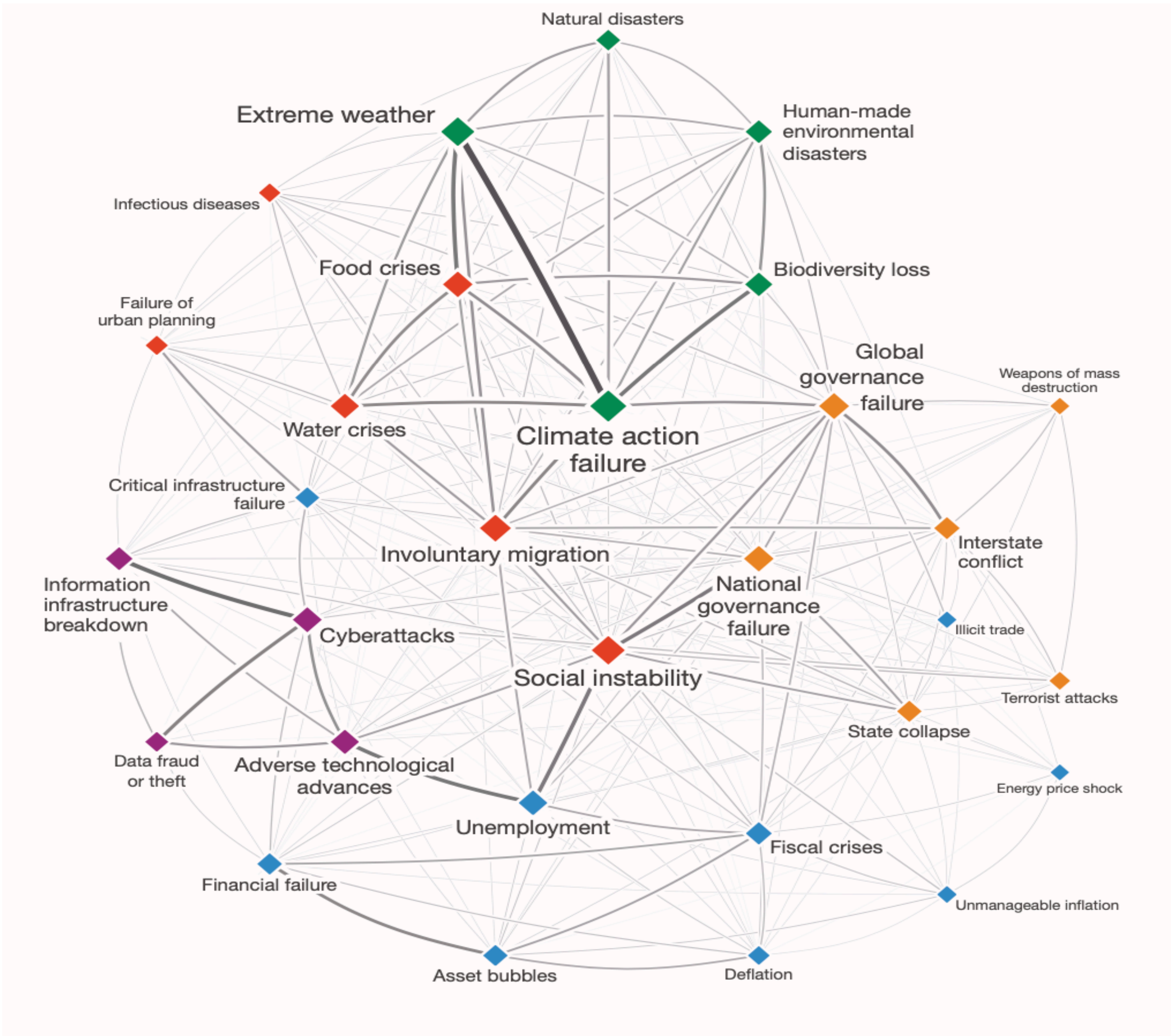
Brain Networks



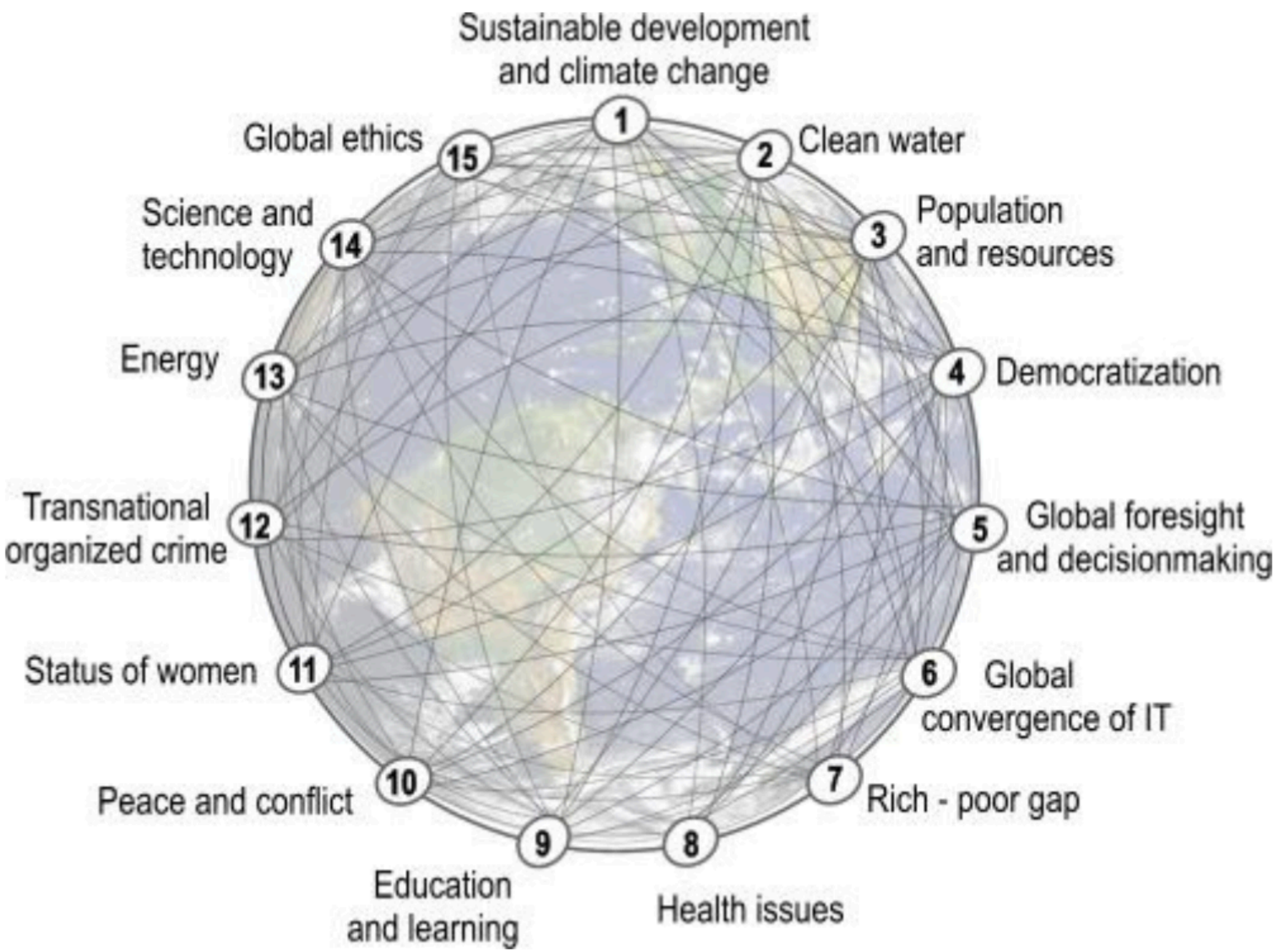
Human Disease Network



WEF Global Risks Interconnections Map 2020

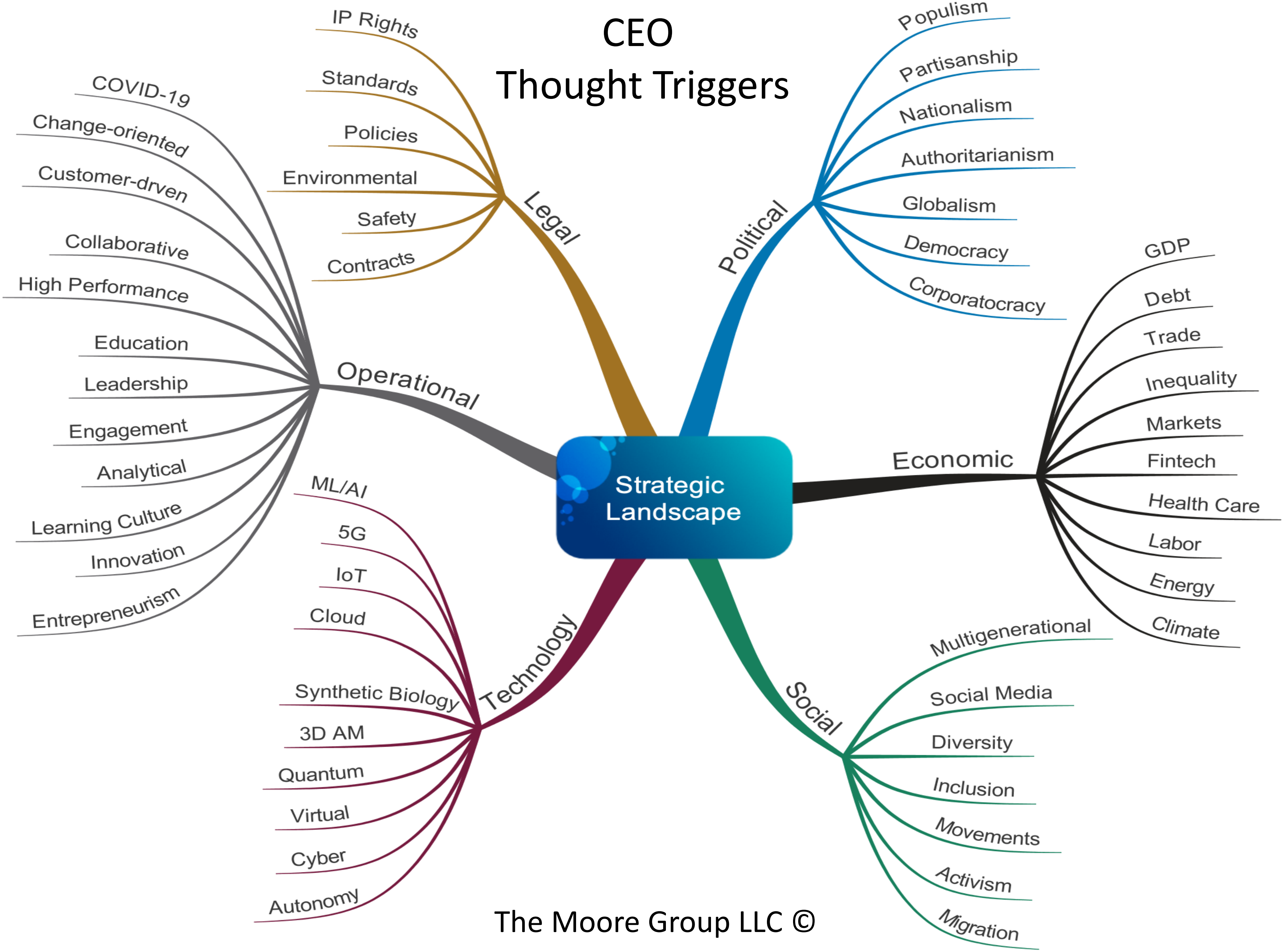


The Millennium Project
15 Global Challenges

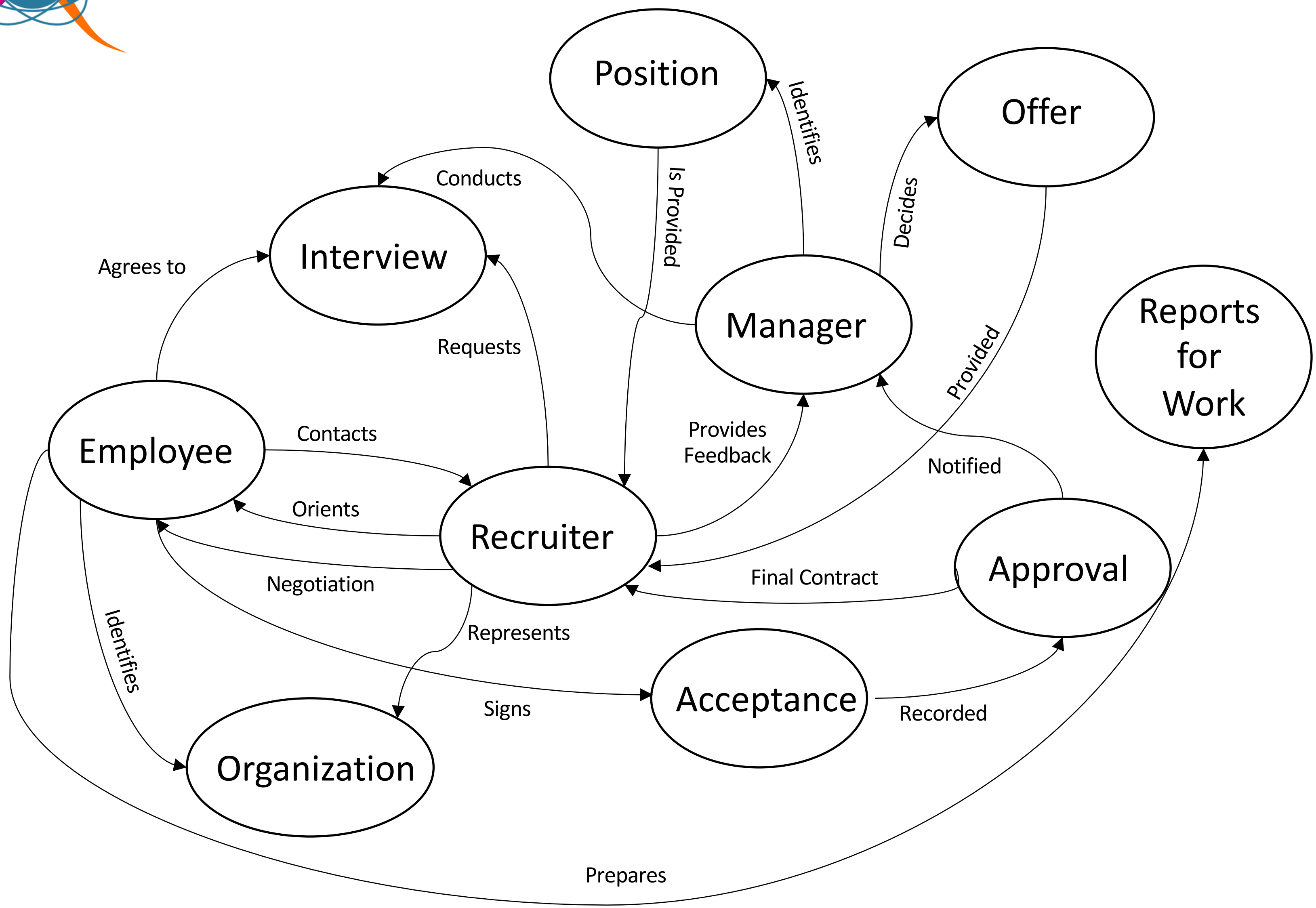


http://www.millennium-project.org/projects/challenges/

CEO Thought Triggers



Cognitive Map



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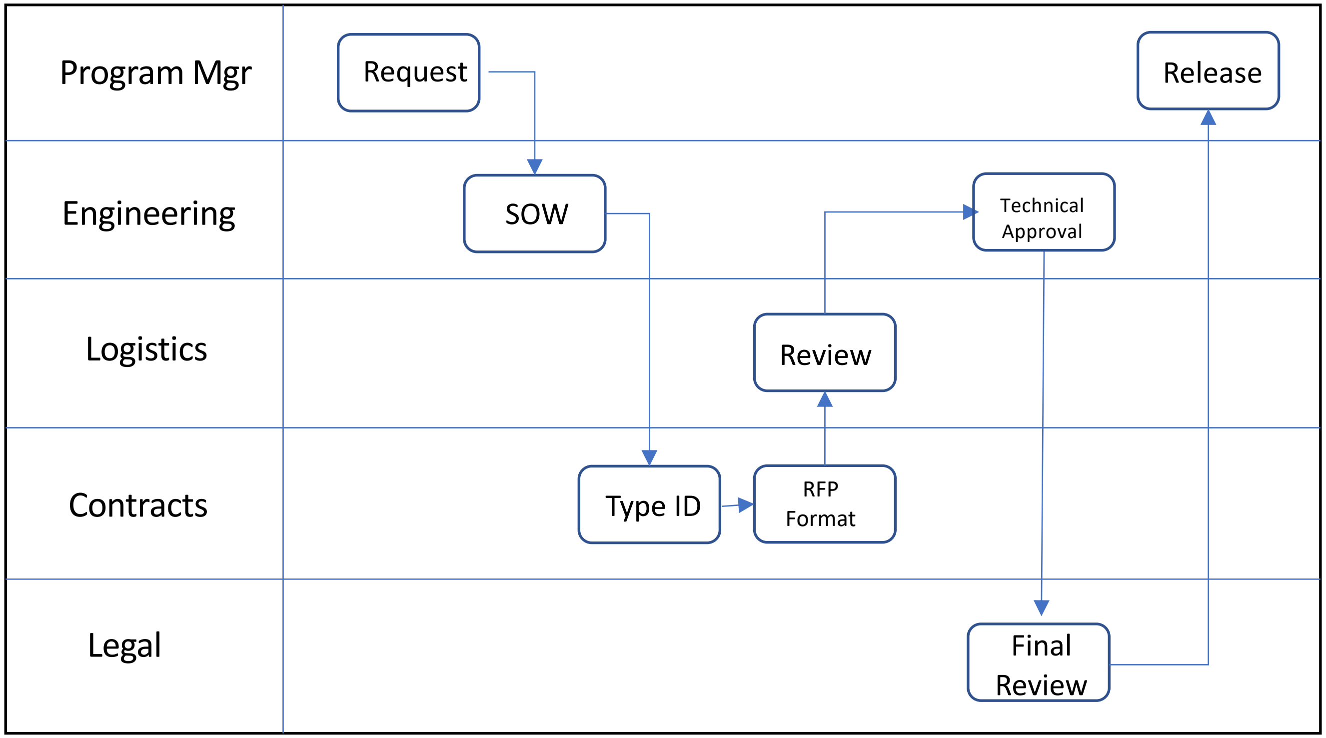
Process Swimlane Map

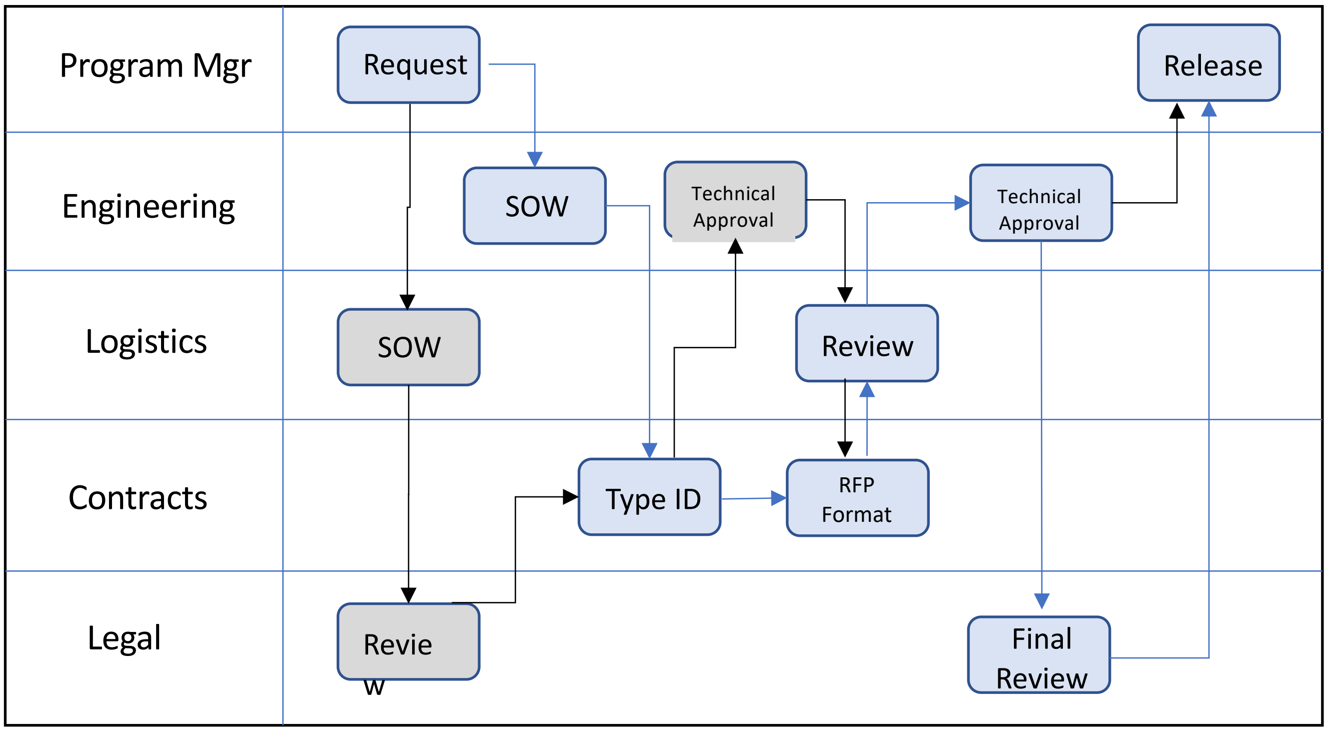
Notional Example: RFP Development



Good for: Exploring interactions and interdependencies across organizational silos

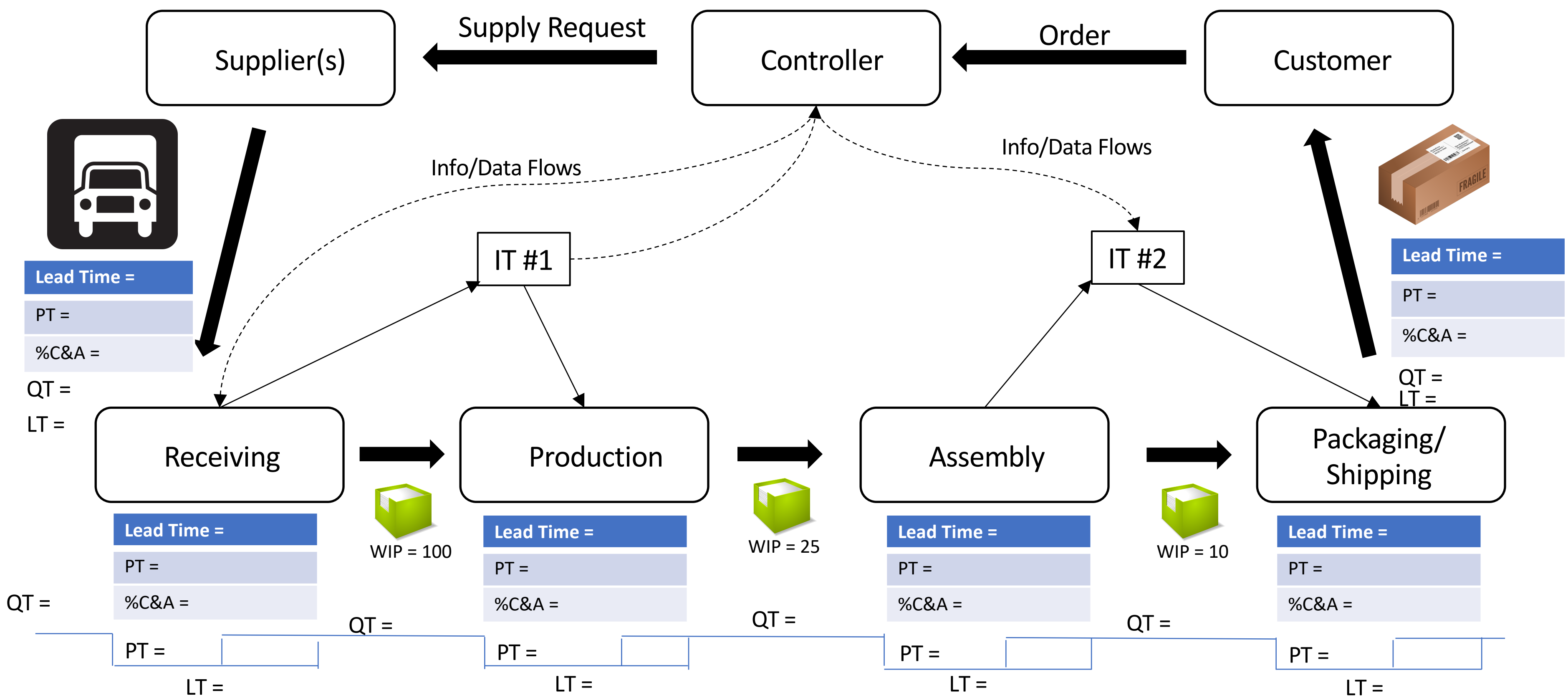
Complexity Process Swimlane Map

Notional Example: RFP Development



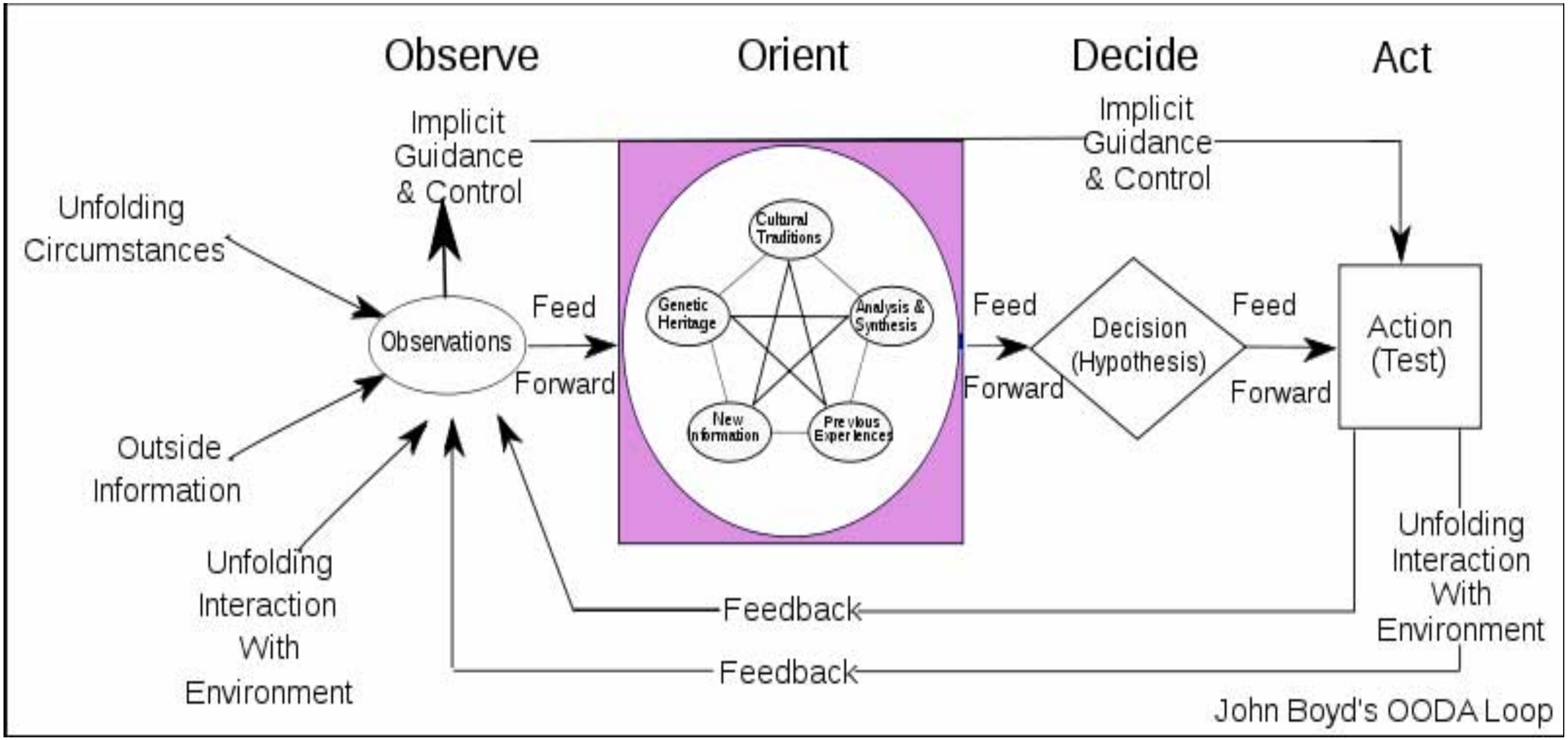
Good for Identifying How Different Organizations Do the Same Things – Best Practices ID & Standardization

Value Stream Map (notional example)



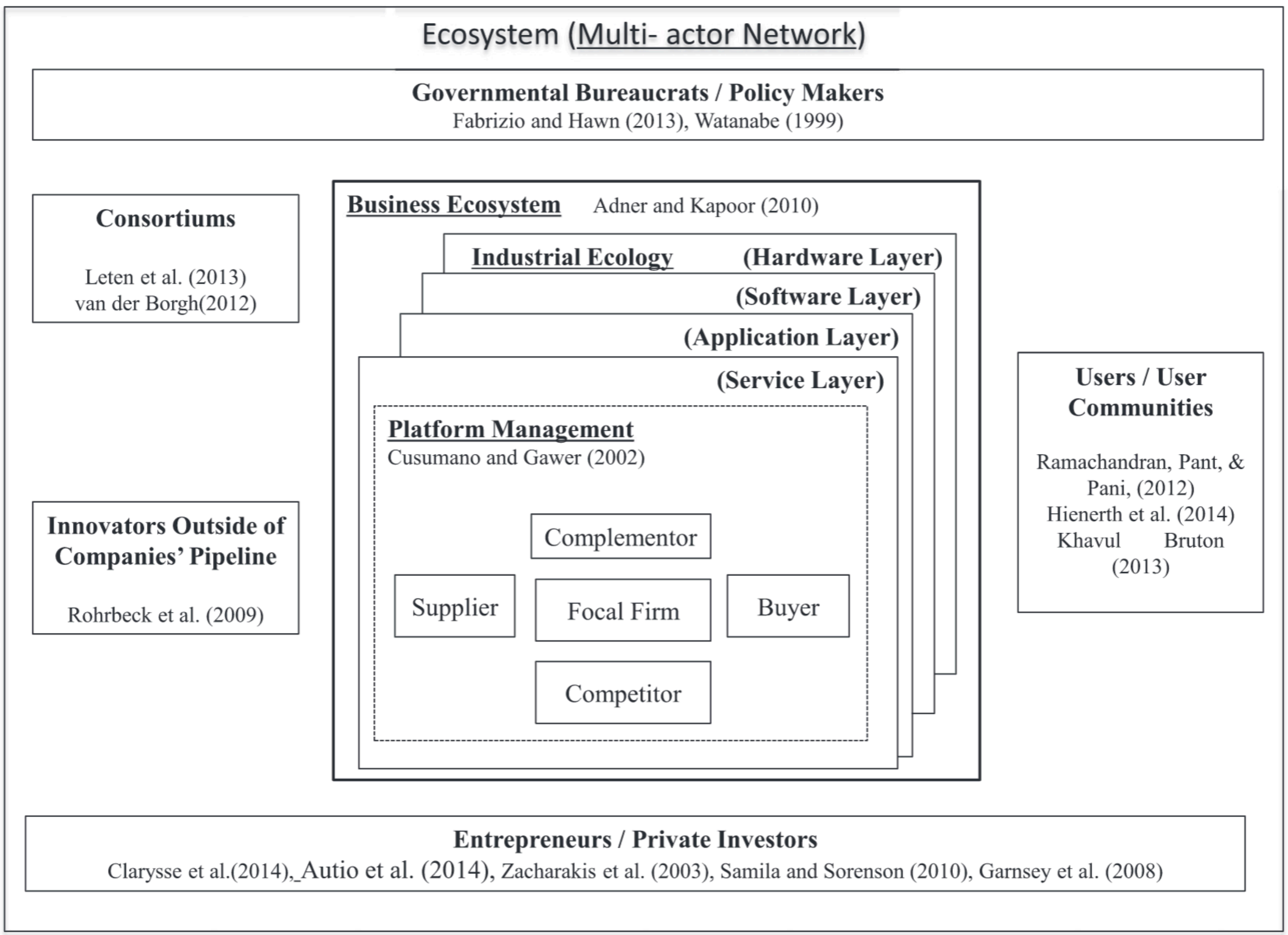
Other Metrics: # Staff/Operators, Change Over/Set-Up Time, Uptime, Overtime, Backlog

John Boyd's OODA-Loop



A Review of the Ecosystem Concept
Toward Coherent Ecosystem Design

M. Tsujimoto et al. *Technological Forecasting & Social Change 136 (2018) 49–58*



Leveraging Complexity for Ecosystem Innovation

M.G. Russell, N.V. Smorodinskaya *Technological Forecasting & Social Change 136 (2018) 114–131*

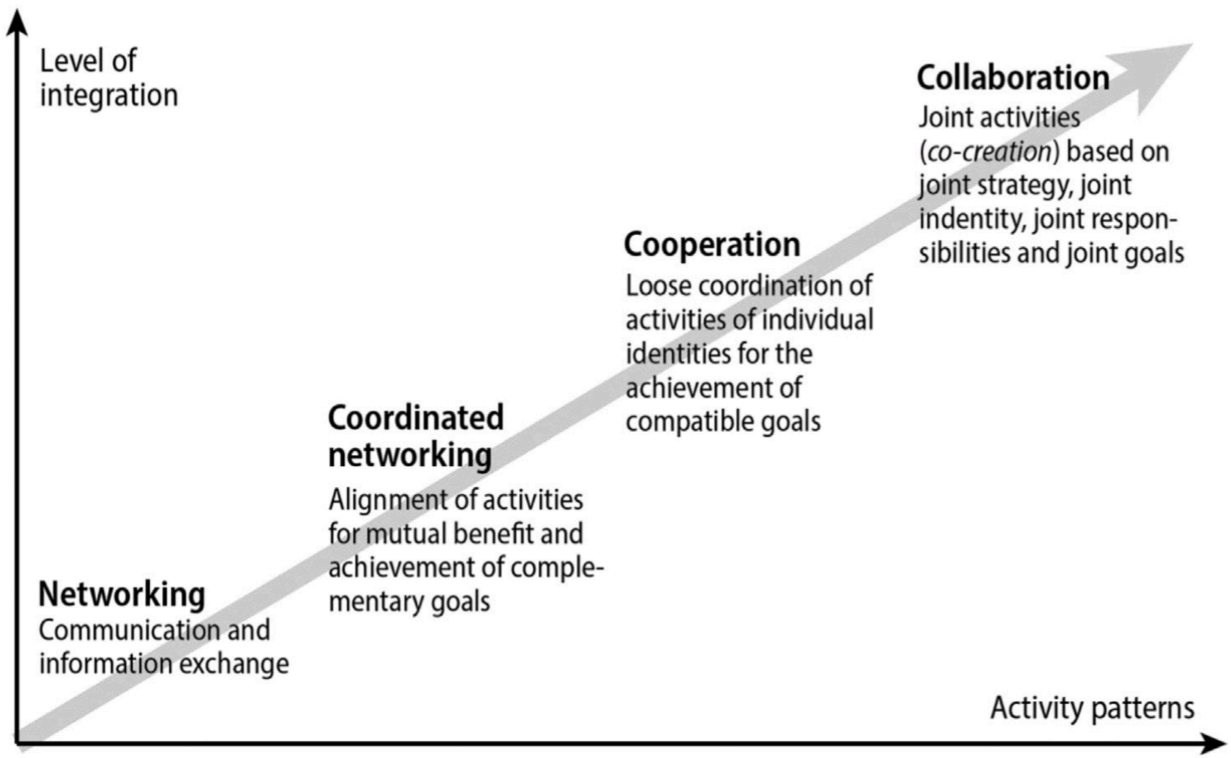


Fig. 1. The growing complexity of interactions and integration of activities from networking to collaboration.
Source: adapted from (Camarinha-Matos and Afsarmanesh, 2008b, p. 312).

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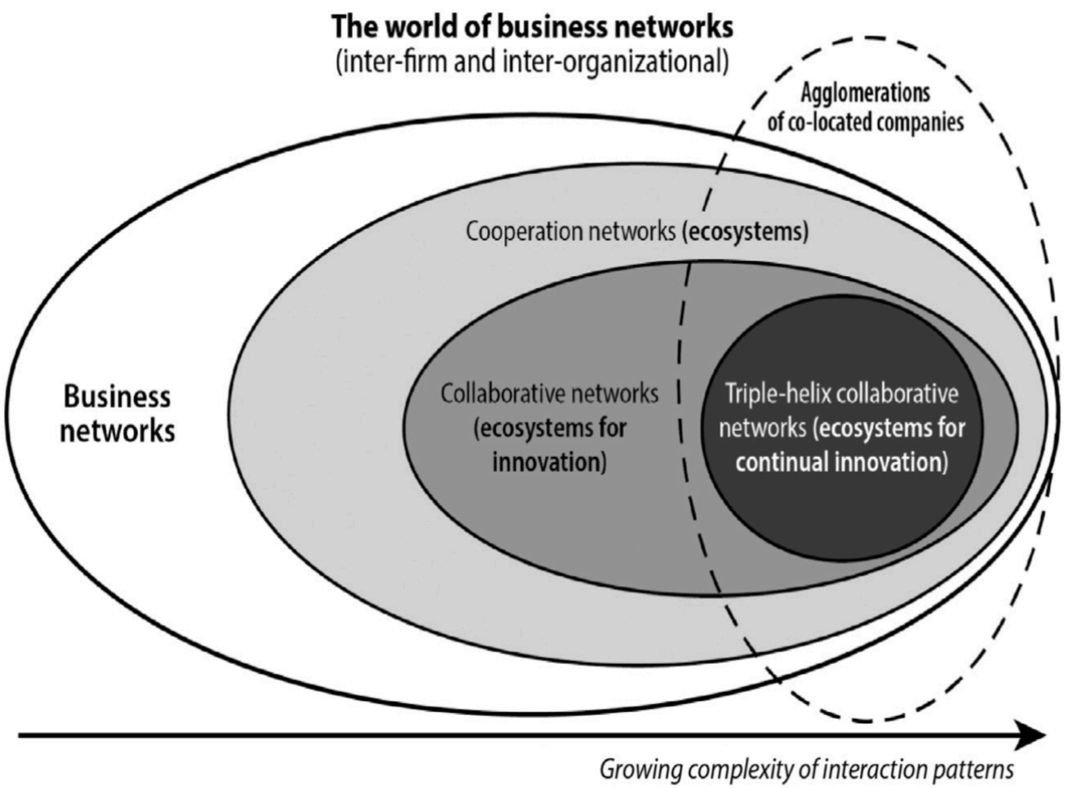

Fig. 2. Differentiating innovation capacity of business networks by their internal interaction complexity.
Source: authors' elaboration based on literature on networks, clusters and innovation.

Triple Helix = Business Sector + Knowledge Generating Sector + Public Sector

Leveraging Complexity for Ecosystem Innovation

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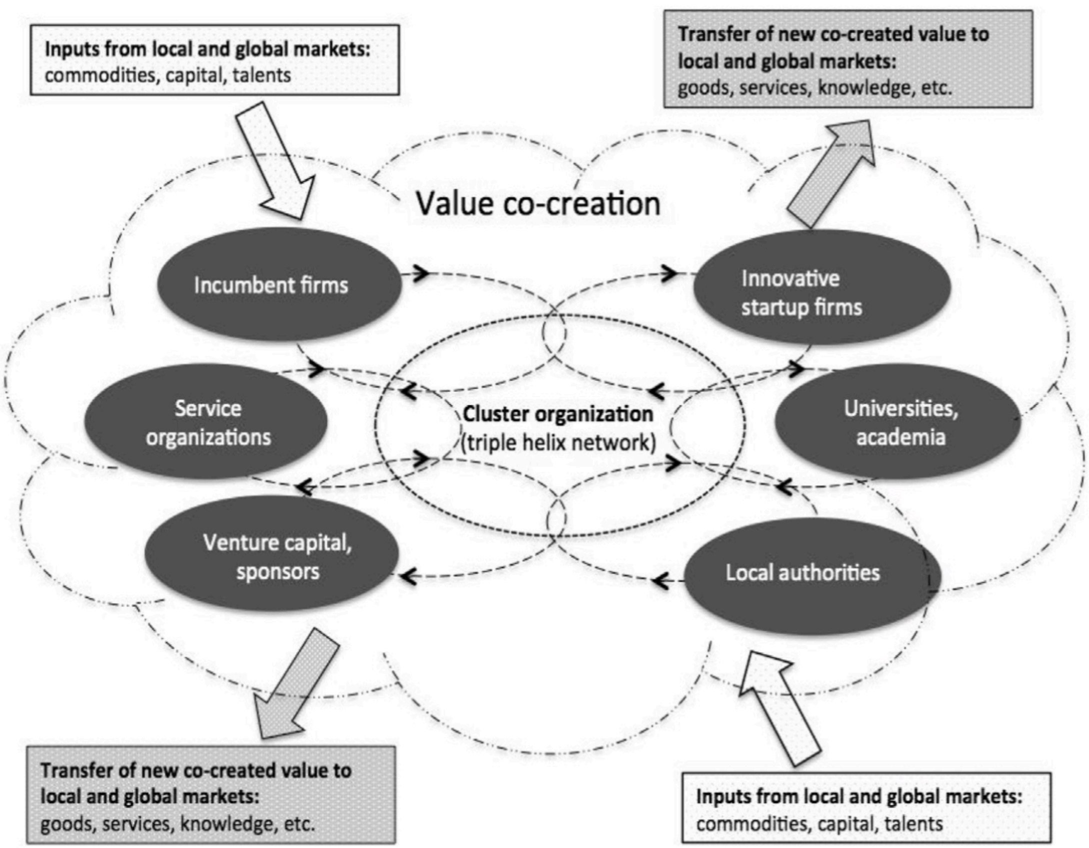


Fig. 3. The complexity of an ecosystem in a regional innovation cluster.
Source: authors' design, based on: (Napier and Kethelz, 2014).

Innovation Ecosystems are Complex Adaptive Systems

- Externally Sensing/Open
- Network 'Non-Linear' Effects
- Non-Deterministic
- Iterative Feedback Loops
- Real-Time Adaptable
- Self-organizing
- Self-Regulating
- Self-Governing
- Scales-Up/Scales-Down Easily
- Interaction Dependent
- Aggregated Behaviors
- Emergence Enabled
- Holistic & Synergistic

Triple Helix = Business Sector + Knowledge Generating Sector + Public Sector

AMFG White paper – The 3D AM Landscape

BREAKING DOWN THE ADDITIVE MANUFACTURING LANDSCAPE

Of the **171 organisations** featured in the AM landscape, there are:

92 Hardware manufacturers

32 Software vendors

29 Material developers and suppliers

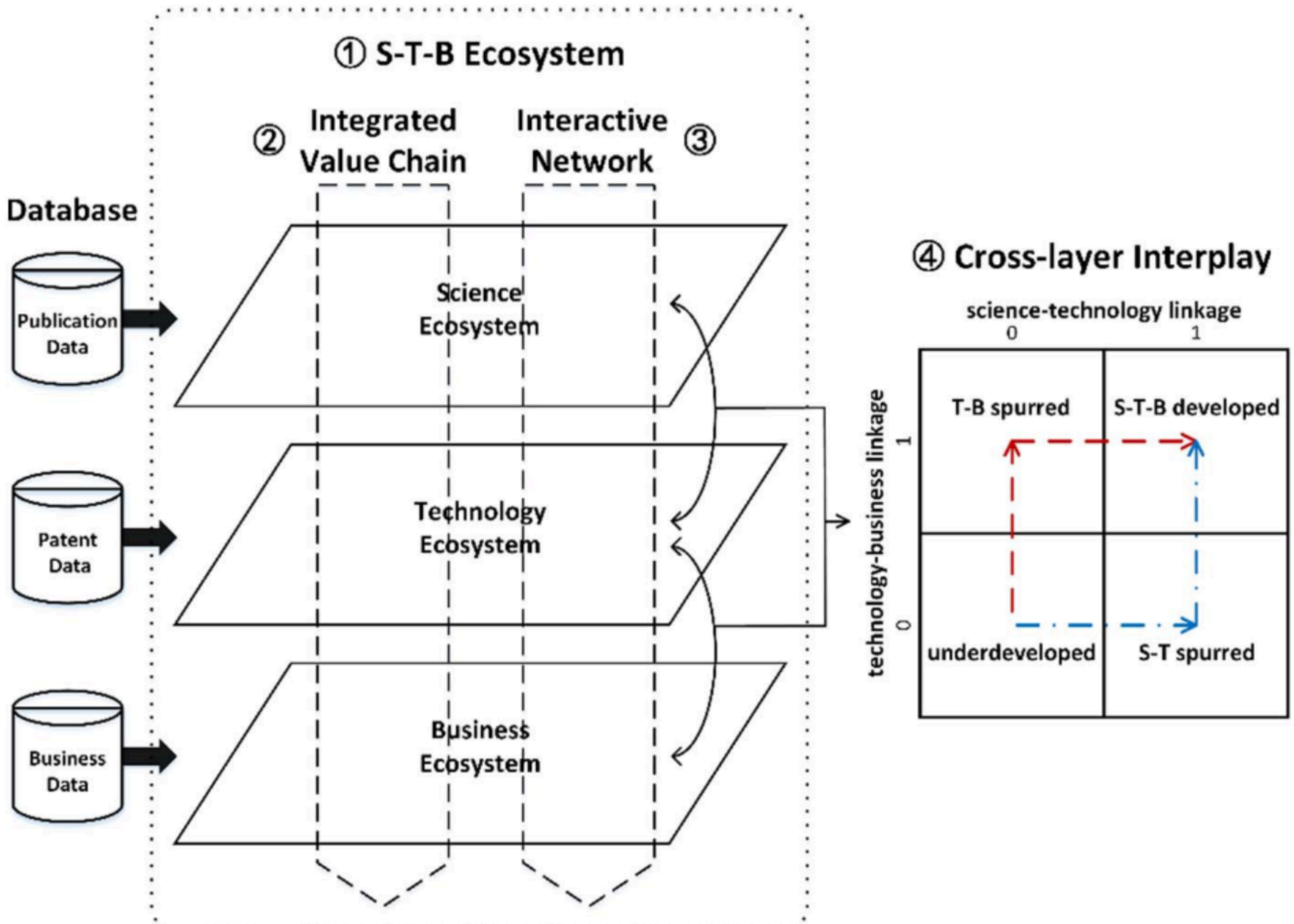
11 Research institutions

5 Post-processing system manufacturers

3 QA and process inspection companies

https://amfg.ai/wp-content/uploads/2019/08/The-Additive-Manufacturing-Landscape-2019_Whitepaper.pdf

Exploring Innovation Ecosystems Across Science, Technology, and Business: A Case of 3D printing in China
Xu, Wu, Minshall, Zhou (2018)



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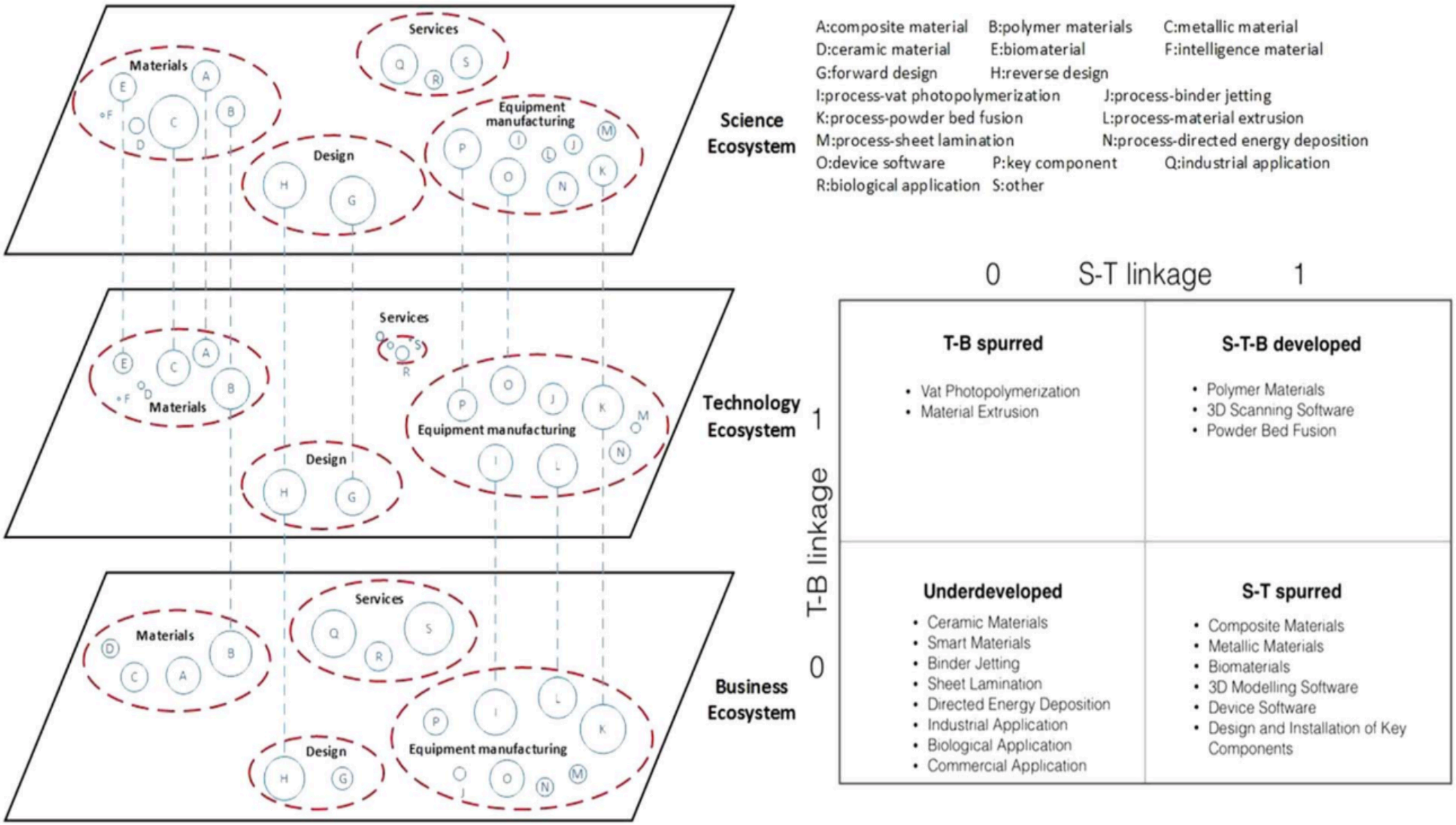

Fig. 6. Cross-layer analysis of integrated value chain of 3D printing in China.

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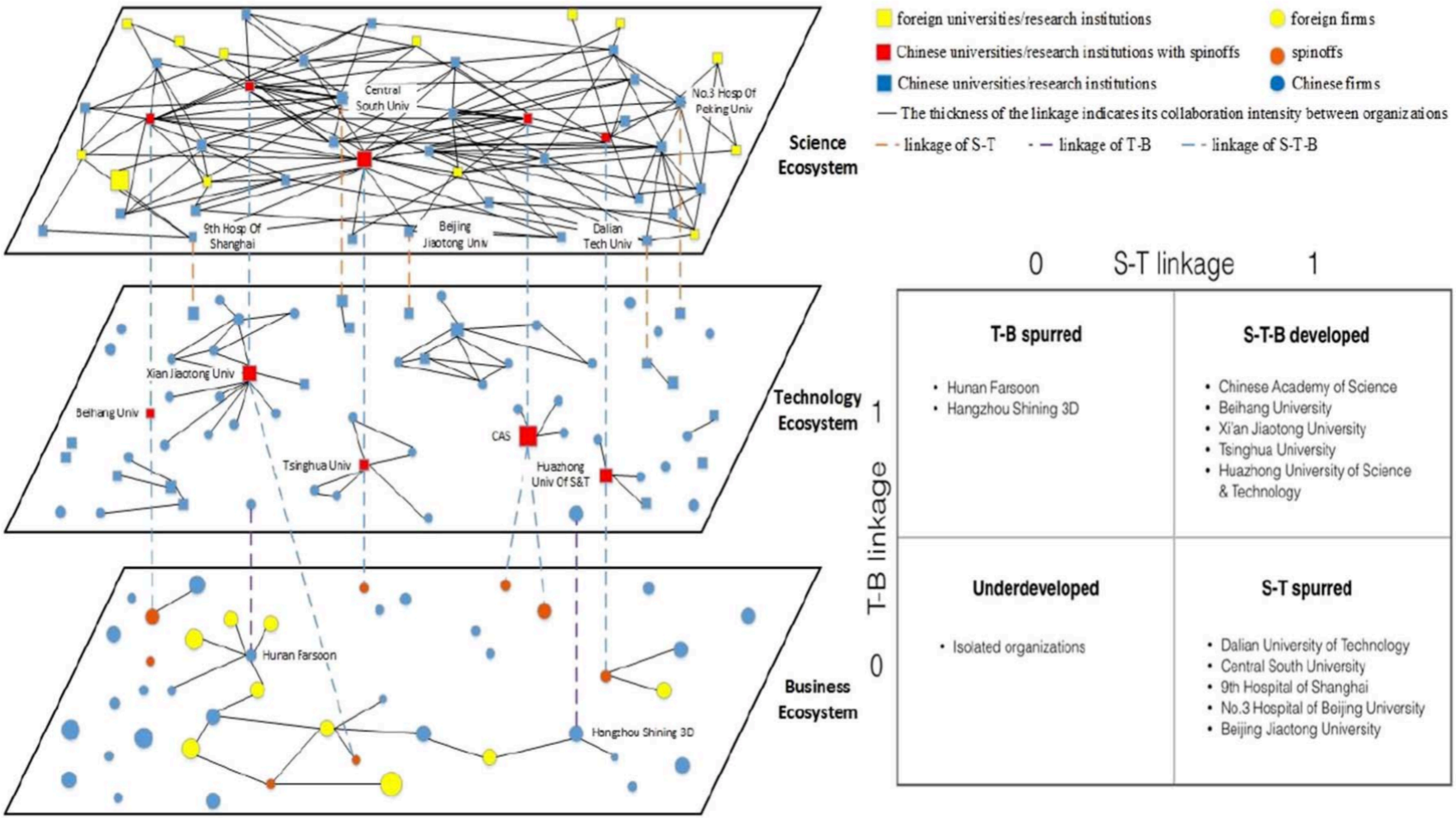
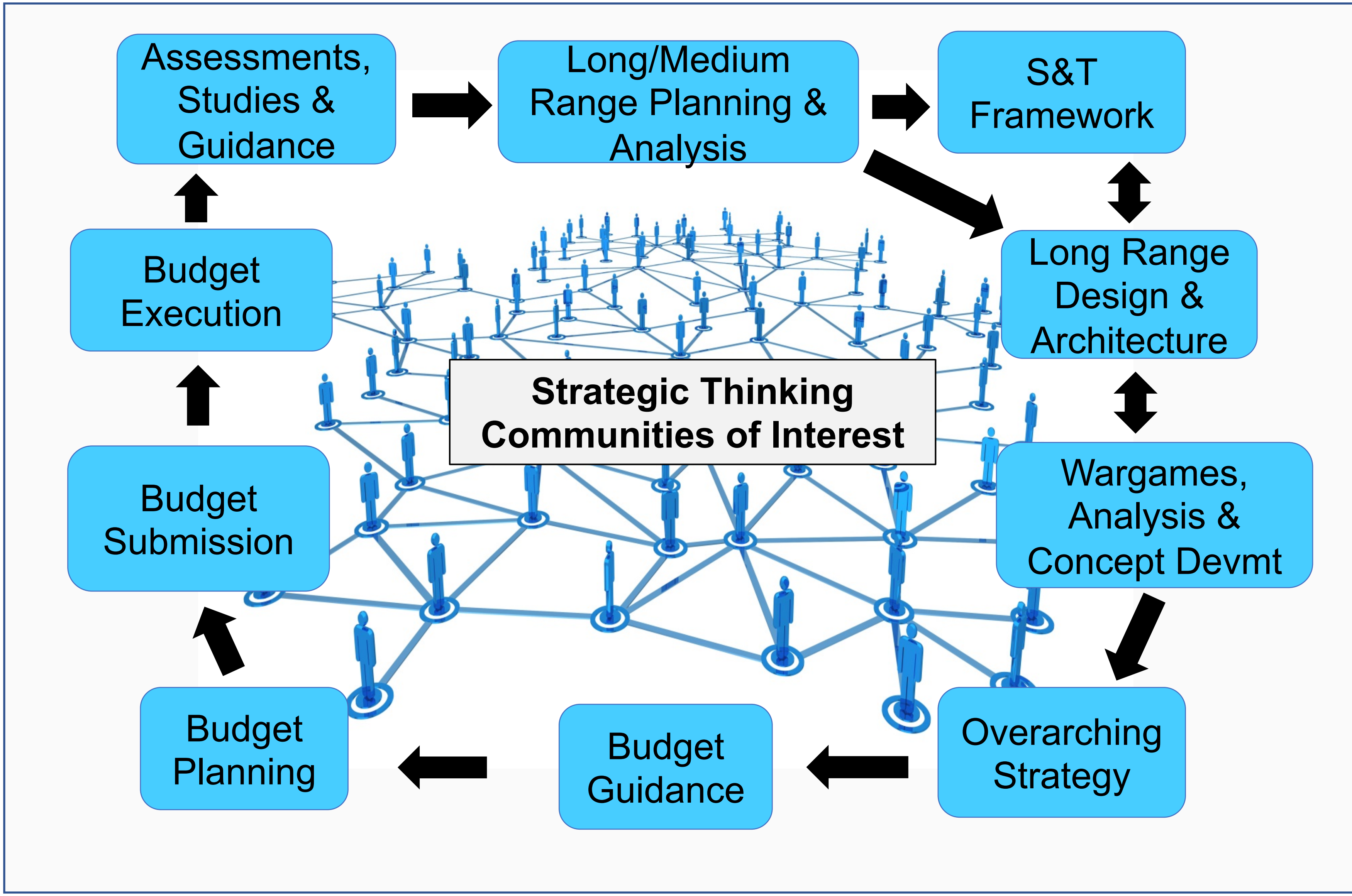
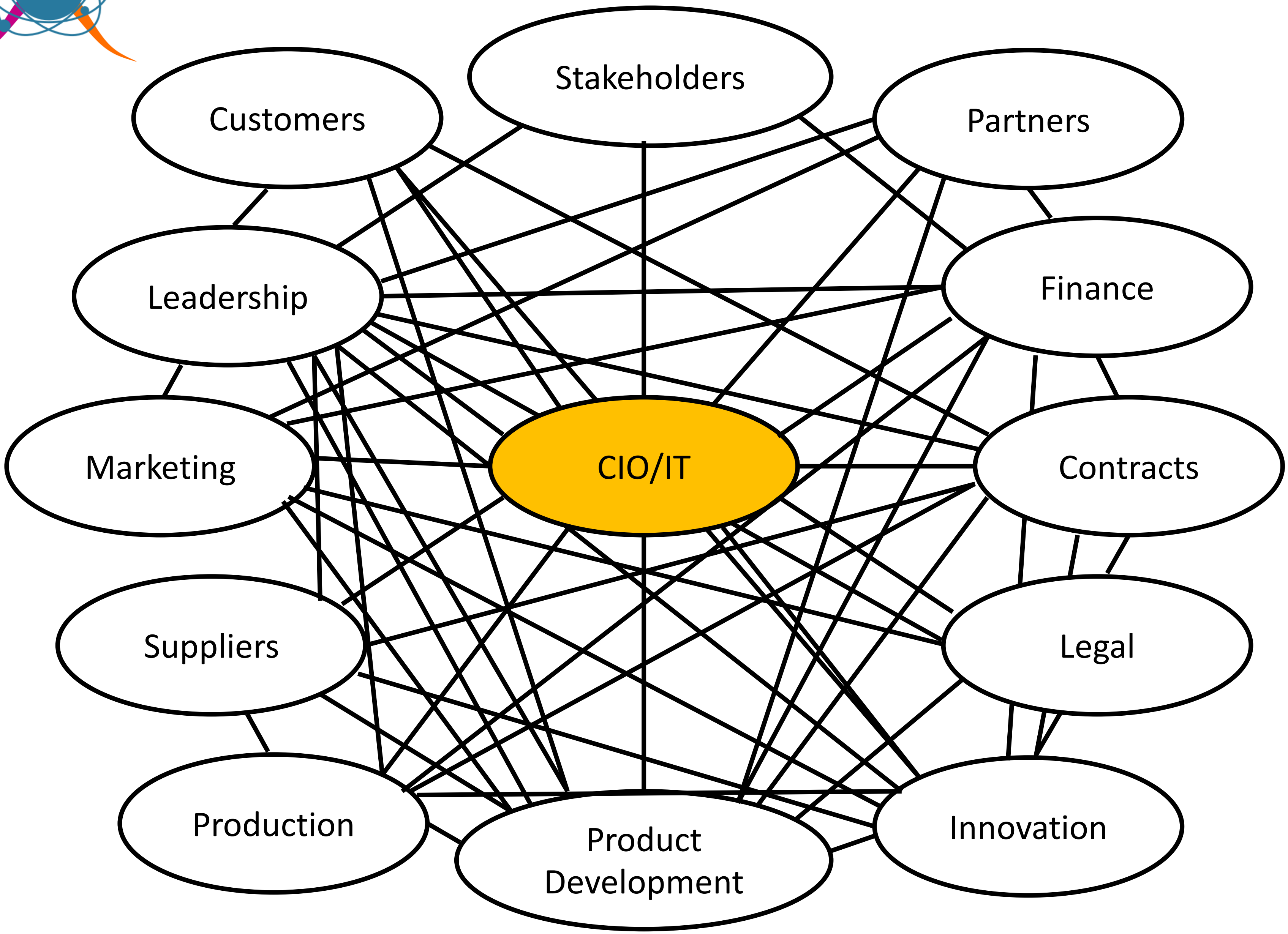


Fig. 10. Cross-layer analysis of collaborative network of 3D printing in China.

Closed-loop Strategy Development to Deployment Process

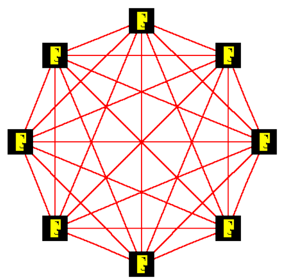


Notional Example from a CIO's View

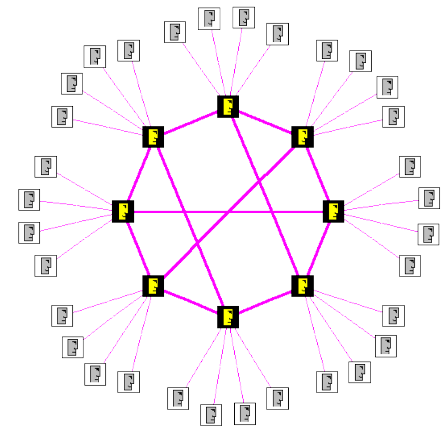


Strategic Organizational Networks

Typical Organization



Agile/Flexible Organization



<u>Local Reach</u>

Closed Network

- Low Performance
- Few independent sources of info
- “Effective size” is smaller
- Little Diversity (more homogeneous)
- Dense Internal Flows

<u>Local and Non-Local Reach</u>

Entrepreneurial/Open Network

- High Performance
- Many independent sources of info
- Increased opportunities
- “Effective size” is greater
- Greater Diversity
- External plus Internal Flows

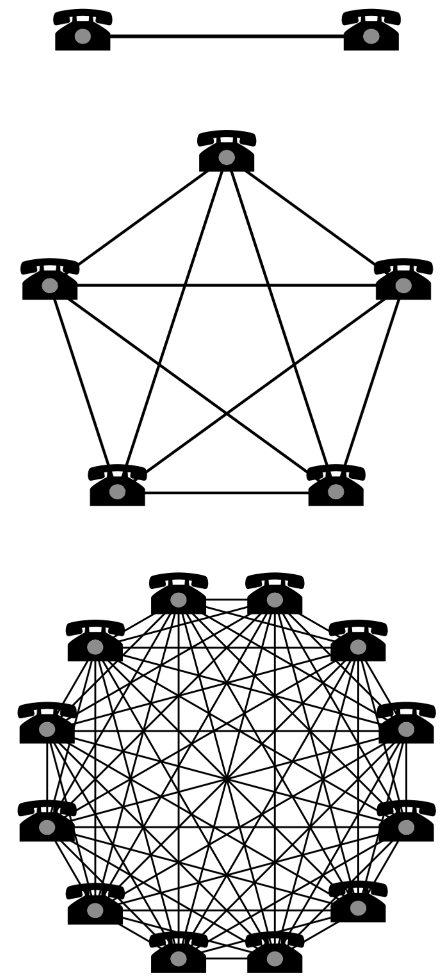
Krebs, Knetmap.com
Inflow SNA Software

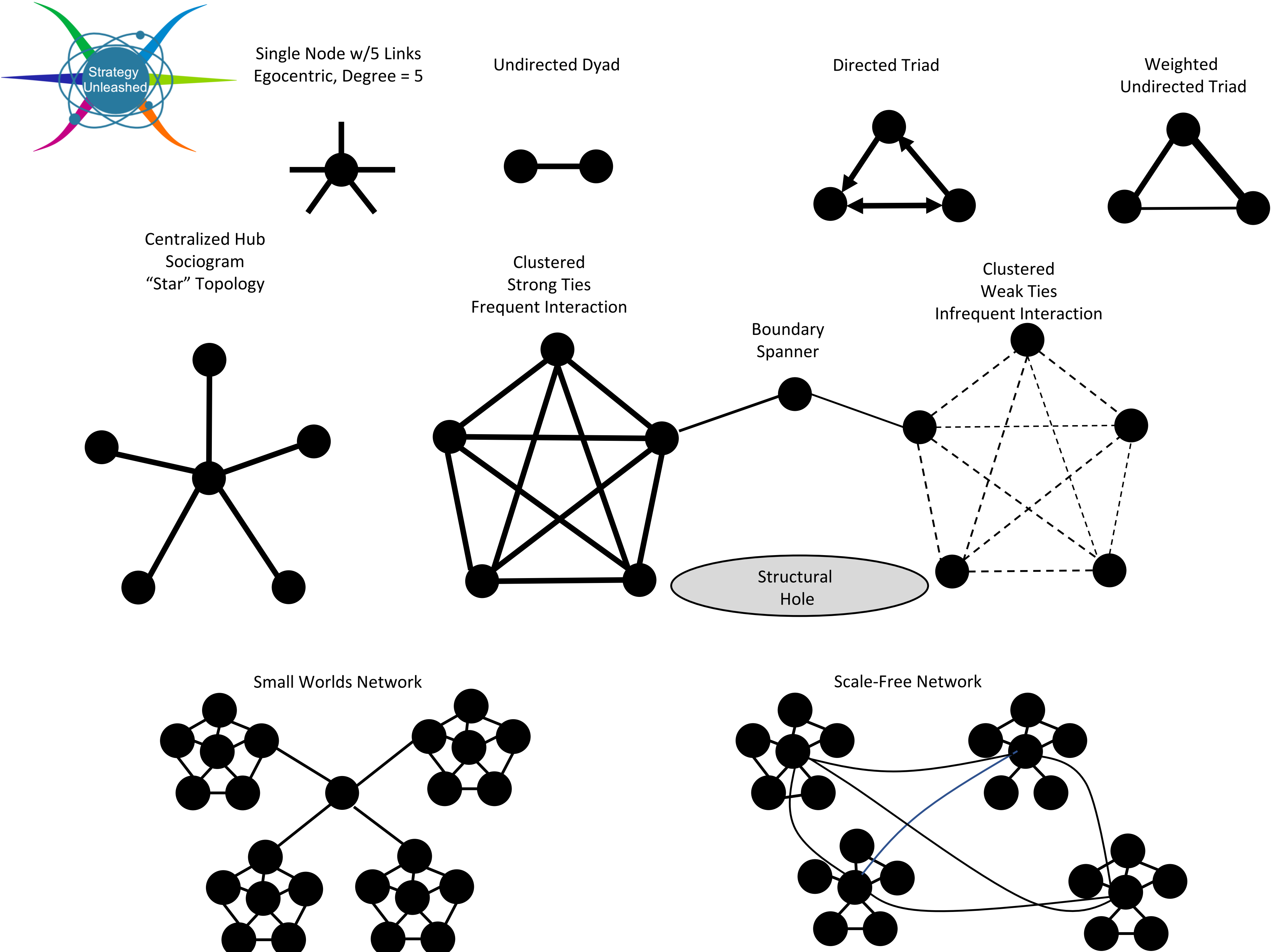
Metcalfe’s Law

The value from the network is
proportionate to the number of nodes (n) squared.

Value ~ n^2

Other factors such as connection quality, speed, trust, topology, processing time, subgroups etc. all play strong roles.





Strategy Unleashed
Single Node w/5 Links
Egocentric, Degree = 5
Undirected Dyad
Directed Triad
Weighted
Undirected Triad
Centralized Hub
Sociogram
"Star" Topology
Clustered
Strong Ties
Frequent Interaction
Boundary
Spanner
Clustered
Weak Ties
Infrequent Interaction
Structural
Hole
Small Worlds Network
Scale-Free Network

Key Network Graphing Terms and Concepts

Term/Variable	Description	Utility
Node or Actor	Entity, Object or Person	Number of Nodes Determines the Complexity
Link or Edge	Connection	Determines Relationship
Dyad	Two Nodes of Actors that are Linked	Simple Relationship
Triad	Three Nodes or Actors with Possible Links	Six Possible Combinations
Degree	Number of links to a Node	Extent of Connectivity
Centrality	Closeness to the Center	Extent of Network Access
Path Length	# of Links Between Two or More Nodes or Actors	Measure of Centrality and Connectivity
Egocentric Graph	Network around single node or actor	Single Entity-level View
Sociometric Graph	Multi-node network w/o central node	Network-level view that illuminates topology
Directed Graph	Link or relationship with a directional flow	Indicates pathways and directionality
Undirected Graph	Link w/o a direction or flow	Indicates Links Only
Weighted Graph	Link with an attribute strength depicted	Indicates Extent of Relationship or Flow
Centralized Graph	Network with discernable hub	Depicts Area of Network Focus
Decentralized Graph	Network with no discernable hub	Network Topology w/o Centralized Focus
Distributed Graph	Network with distributed architecture	Balanced Node and Link Distribution
Hub	Center of the Network	Central Focus of Network
Clustering	Groupings of Nodes	Areas Where Grouped Activities are Occurring
Density	Degree of existing linkages compared to maximum potential linkages	Extent of Linkages among Nodes or Actors
Hierarchy	Top-Down/Bottom-Up Information Flow Architecture	Command and Control Architecture
Heterarchy	Multi-level/Inter-level Information Flow Architecture	Lateral and Ubiquitous Flows across the Network
Structural Holes	Gaps in the network	Locations where New and Novel Information, Value or Latent Potential Exists
Small Worlds	Networks with short path lengths and high clustering	Network Groupings in Clusters often Connected to Larger Networks
Scale Free	Network with power law distribution of node degrees	Resilient Network Topology

A SOCIAL NETWORK ANALYSIS OF THE NATIONAL MATERIALS COMPETENCY AT NAVAL AIR SYSTEMS COMMAND

by

Dale L. Moore

September 2002

Thesis Advisor: Gail Fann Thomas
Thesis Associate Advisor: Mark E. Nissen

Approved for public release; distribution is unlimited.

Baseline Lay-Out

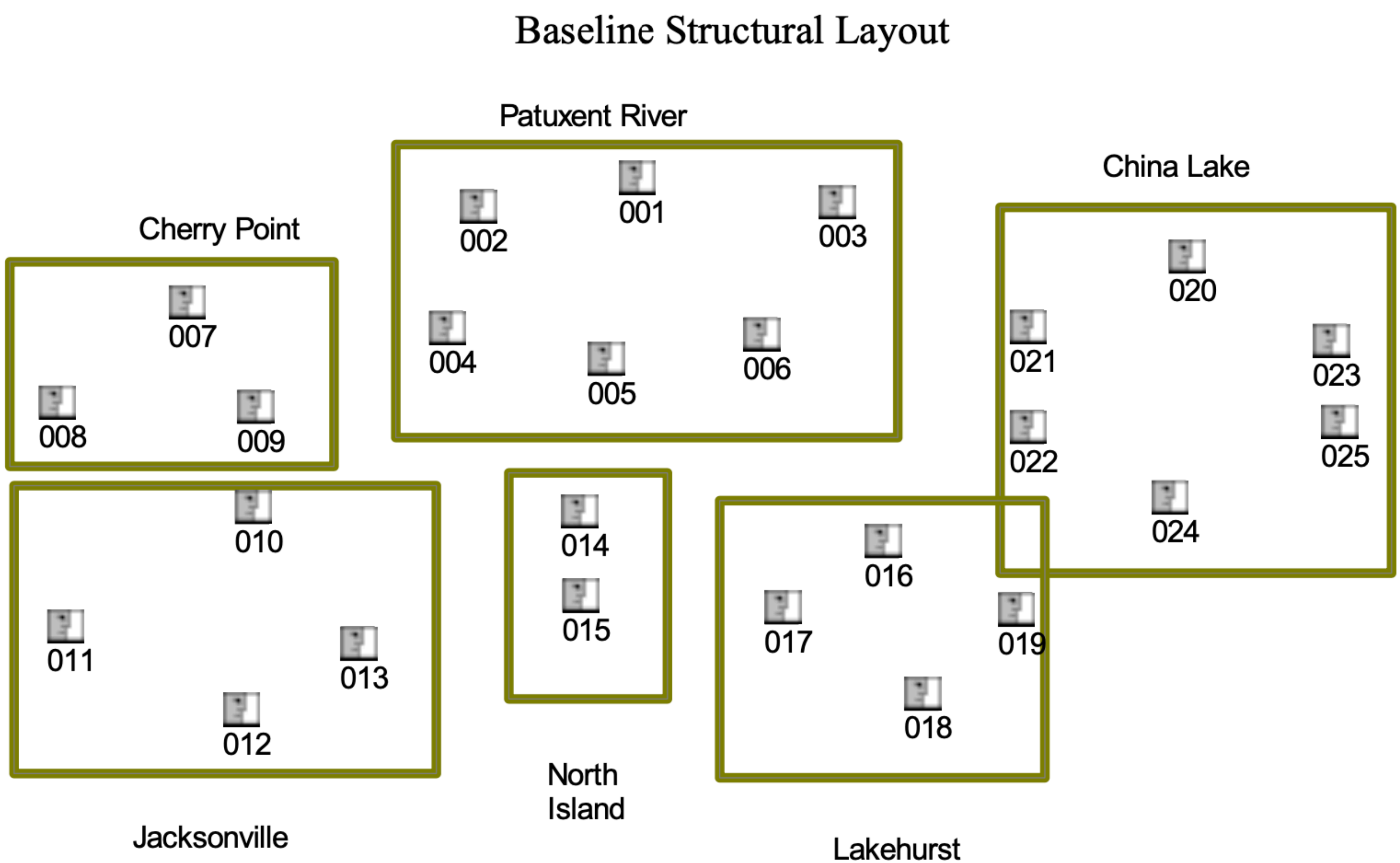


Figure 6. Baseline Structural Layout for InFlow 3.0 Visualizations

Symmetric Ties Only

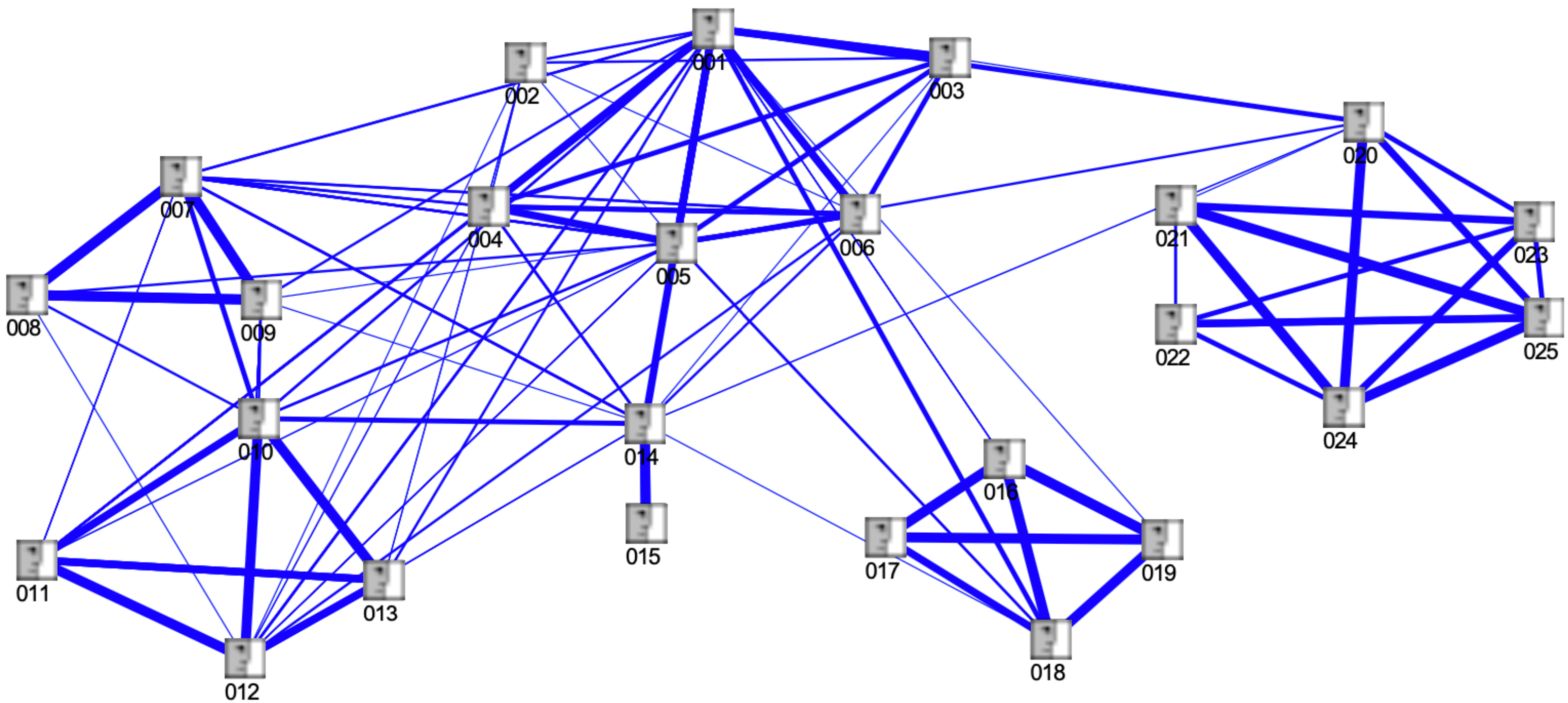
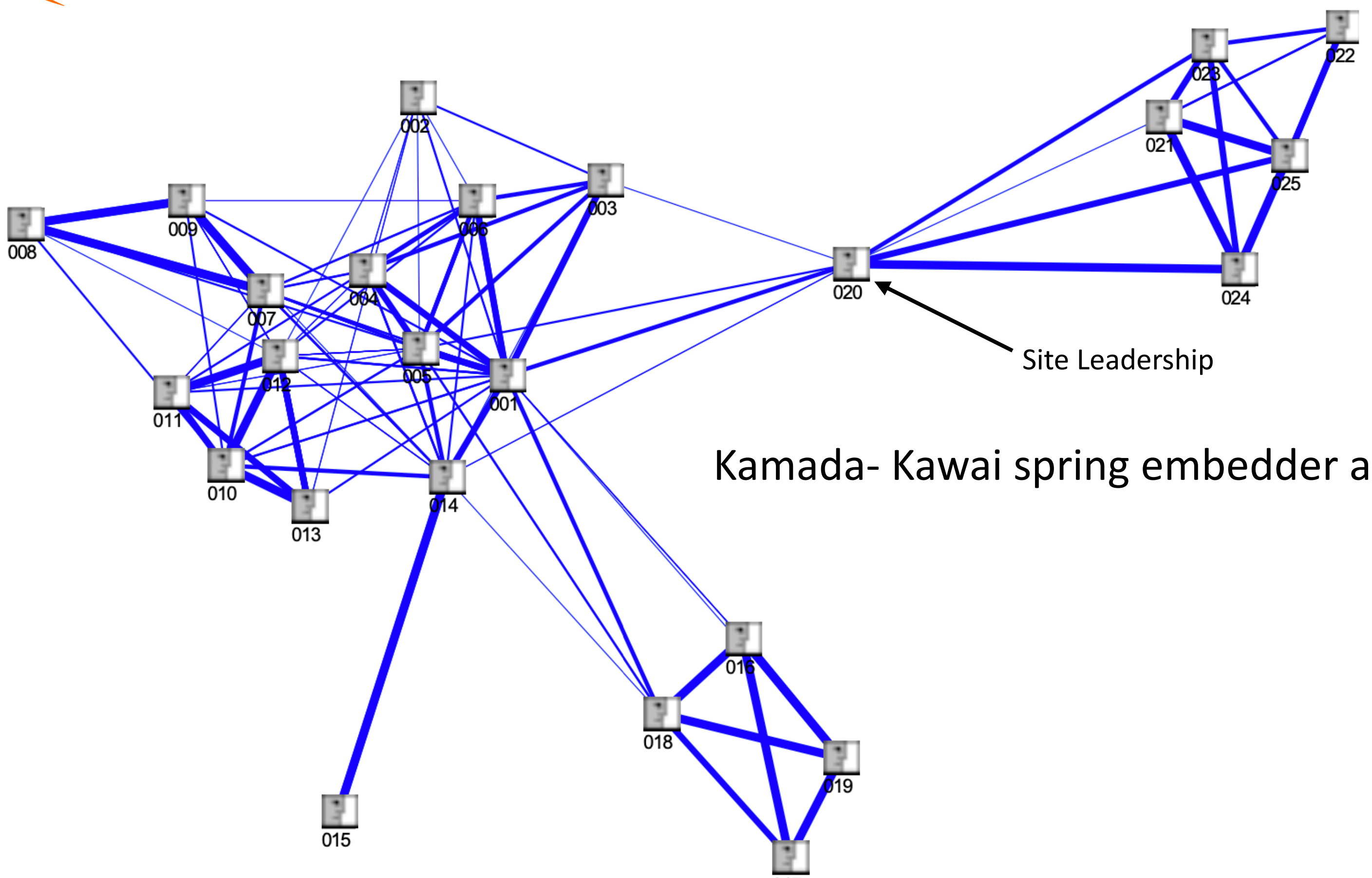


Figure 8. National Level 3 All Question/All Responses with Frequency Weighting and Symmetric Ties Only

Converged/Diverged Emergent Structure



Kamada- Kawai spring embedder algorithm

Figure 9. National Level 3 All Questions/All Responses with Frequency Weighting and

Symmetric Ties Only Arranged Emergent Structure

One Way/Two Way Directional View

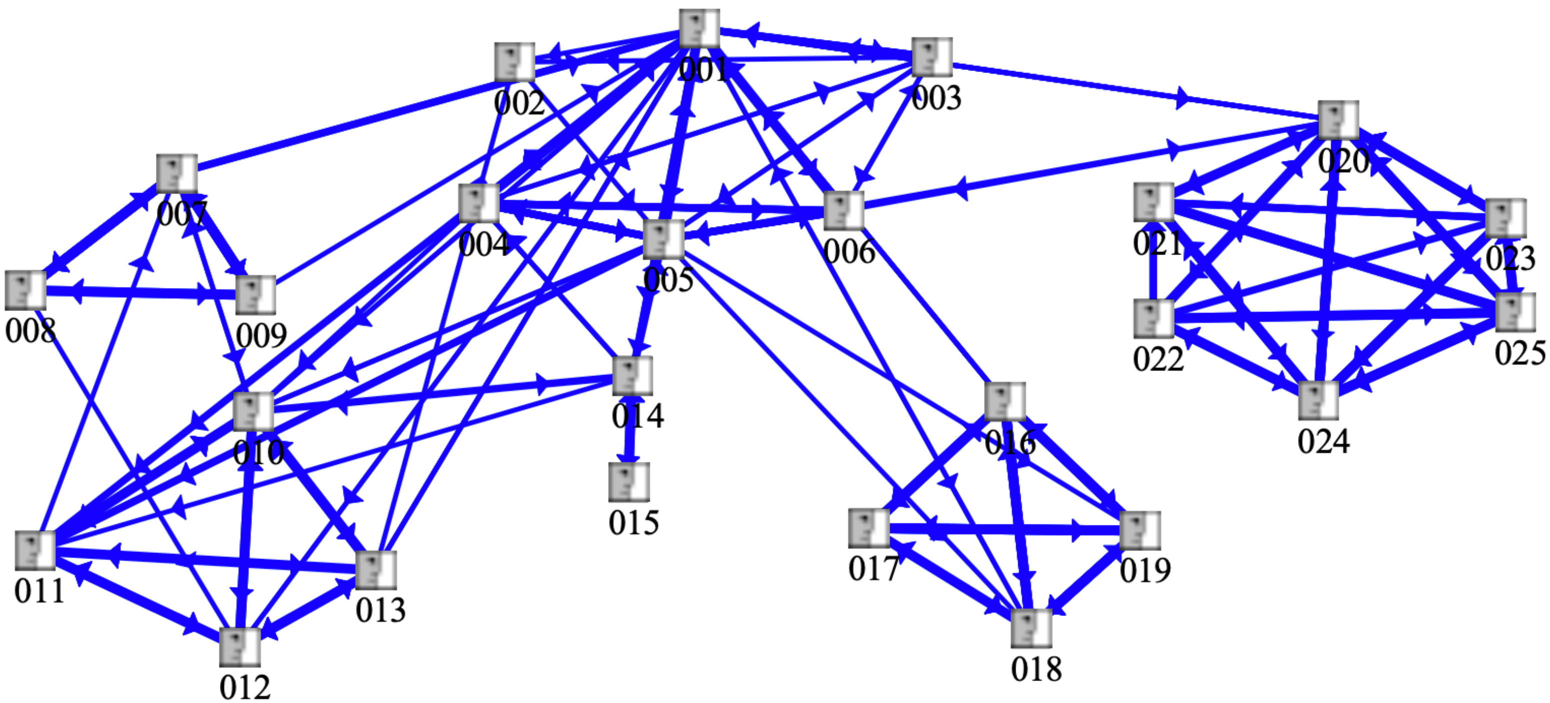


Figure 10. National Level 3 All Questions/Responses 3 to 5 Frequency Weighting, One and Two-way Directionality

Notable Impediments to Knowledge Flow

Physical/Organizational Constraints

- Time Availability
- Resources Constraints
- Lack of Cross-site Video-teleconference Capability
- Competition for Resources
- Geographically Dispersion
- Structural Difference: Hiring, Awards, Promotions, Funding, Code Assignments, Performance Metrics
- Infrequency of Management-level Interactions
- Inadequate Opportunities for Formal or Informal Exchange

Notable Impediments to Knowledge Flow

<u>Social Constraints</u>

- Inadequate Knowledge and Awareness of Individual and Site Skills and Capabilities
- Competition for Resources
- Resistance to Change
- Lack of Trust and Respect
- Inadequate Awareness of Lessons Learned
- Not Knowing Others: Expertise, Capabilities, Programs
- Reluctance to Problem Solving by “Committee”
- Inadequate Cross-site Support, Endorsement and Acknowledgement

Recommendations to Improve Knowledge Flow

<u>Formal and Informal Relationship Building</u>

- Create Cross-site Enterprise Teams
- Develop More Cross-site Cooperative Programs
- Provide Cross-site Training
- Increase Rotational Assignments between Sites
- Reduce e-Mail, Emphasize Phone Conversations
- Increase One-to-One Interaction
- Educate Organization on Competency Charter, and Competency Operating Guide (COG)
- Increase Formal/Informal Interactions on Technical Issues and Policies
- Engage Working Level on National Projects
- Develop Friendships Throughout National Organization
- Improve National Competency Training
- Continue National Air Vehicle Conference Involvement
- Improve Sharing of National Competency Capabilities

Recommendations to Improve Knowledge Flow

Organizational Processes and Policies Development

- Establish Common Organizational Codes
- Highlight Best Examples of Teamwork
- Seek Level 2 Organizational Buy-in for Competency Operating Guide (COG)
- Establish National "Common" Goals
- Obtain National Level 2 Endorsements for COG
- Develop a Resume Directory
- Post National Competency Requirement, Needs, and Goals
- Improve Definition of Roles and Responsibilities

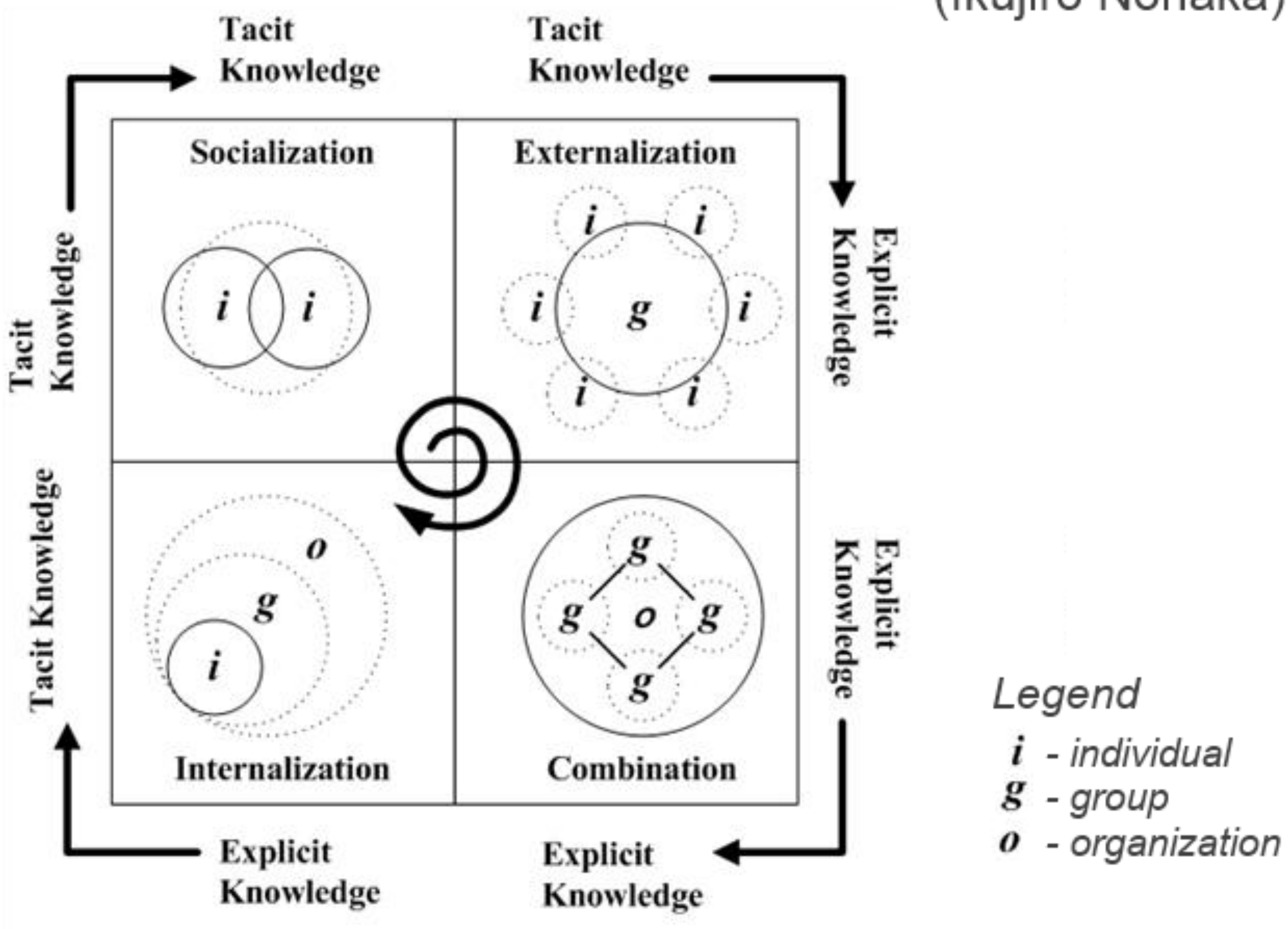
Recommendations to Improve Knowledge Flow

<u>Technology Enabling Enhancements</u>

- Provide Enhanced Collaborative Environments
- Schedule Regular, Planned and Coordinated Video-teleconferences
- Implement the Aerospace Materials Technology Consortium Tele-collaborative Web Portal
- Conduct National Level 4 Meetings (video teleconference enhanced)
- Create Common Databases
- Hold Regular MMB Meetings (site and video teleconference)
- Establish a National Web-site

SECI Model of Knowledge Dimensions

(Ikujiro Nonaka)



Complexity and the Nexus of Leadership

Goldstein, Hazy and Lichenstein (2010)

Complexity science sees ***leadership as an influence process*** that arises through interactions across the organization, leveraging diverse sets of knowledge, ideas, and perspectives to ***create new knowledge and innovation***.

The process of innovation, associated with ***emergence*** and the unfolding of new and novel concepts and ideas across the organization, at every level, as has been described by the term ***"generative leadership."***

Complexity science focuses on the ***interactions within the system*** or organization to enable the ***emergence*** of the new and novel, ultimately to ***build an ecology for innovation through social networks.***

Contemporary practices for knowledge creation and ideation include ***crowdsourcing and open innovation*** concepts which are rooted in complexity science and complexity leadership practice.

"the true catalyst of innovation are the web of relationships – in the nexus of interactions."

Goldstein, Hazy and Lichenstein (2010)

Leadership is About Designing Systems for Emergence

In designing for emergence, an important step is ***distributing intelligence***, which involves making information widely available to everyone.

Openness and accessibility becomes a value in organizations designed for emergence because information is the lifeblood of organizations, the energy that enables innovation and new ideas.

Thus managers who design for emergence do not censor information; rather they unleash it into the organization knowing that some of it will ***create disequilibrium, a necessary condition for organization growth and learning***.

When organizations are designed for emergence rather than fit, or for specific outcomes, ***intelligence is widely distributed, conversations multiply, rich connections among people abound, tension drives innovations, and patterns embody meaning that help guide the organizations***.

Complex Systems Leadership Theory
Hazy, Goldstein & Lichtenstein (2007)

Summary

The ability to "see" and analyze what is happening within organizations through a network-based lens can provide significant insights and foresights leading to more competitive postures and positions.

Taking a network-based view can enhance organizational agility, adaptation to the environment, and help organizations anticipate and better position themselves for the future.

Ultimately, a network-based view provides important insights and perspectives at all levels of leadership - supporting the cultural transformations and technological paradigm-shifts deemed essential for sustaining organizational competitiveness.

Questions?

<u>Contact Information</u>

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