



# 712CD

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Original title on 712 A/B: Net-Enabled Battle Command: System-of-System Test and Evaluation Concept

If the title was revised please list the original title above and the revised title here:

Original Title: Net-Enabled Battle Command: System-of-System Test and Evaluation Concept  
Revised Title: WG06HillDwayne\_2007May31.ppt

### PRESENTED IN:

WORKING GROUP: 6

DEMONSTRATION:

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SPECIAL SESSION 1:

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Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE <b>01 JUN 2007</b>		2. REPORT TYPE <b>N/A</b>		3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>Net-Enabled Battle Command</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>US Army Test and Evaluation Command (ATEC) 4501 Ford Avenue, suite 790 Alexandria, VA 22302-1458</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>See also ADM202526. Military Operations Research Society Symposium (75th) Held in Annapolis, Maryland on June 12-14, 2007, The original document contains color images.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>UU</b>	18. NUMBER OF PAGES <b>40</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

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# NET-ENABLED BATTLE COMMAND

13 June 2007



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# ***Net-Enabled Battle Command Agenda***



- Net-Enabled Battle Command Test and Evaluation Concept
- Mission Domain Metric Development Methodology
- Mission Metrics
  - Speed-of-Command
  - Self-Synchronization
  - Information Superiority
  - Force Agility
- Cognitive Domain Mapping

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# ***Net-Enabled Battle Command Test and Evaluation Concept***

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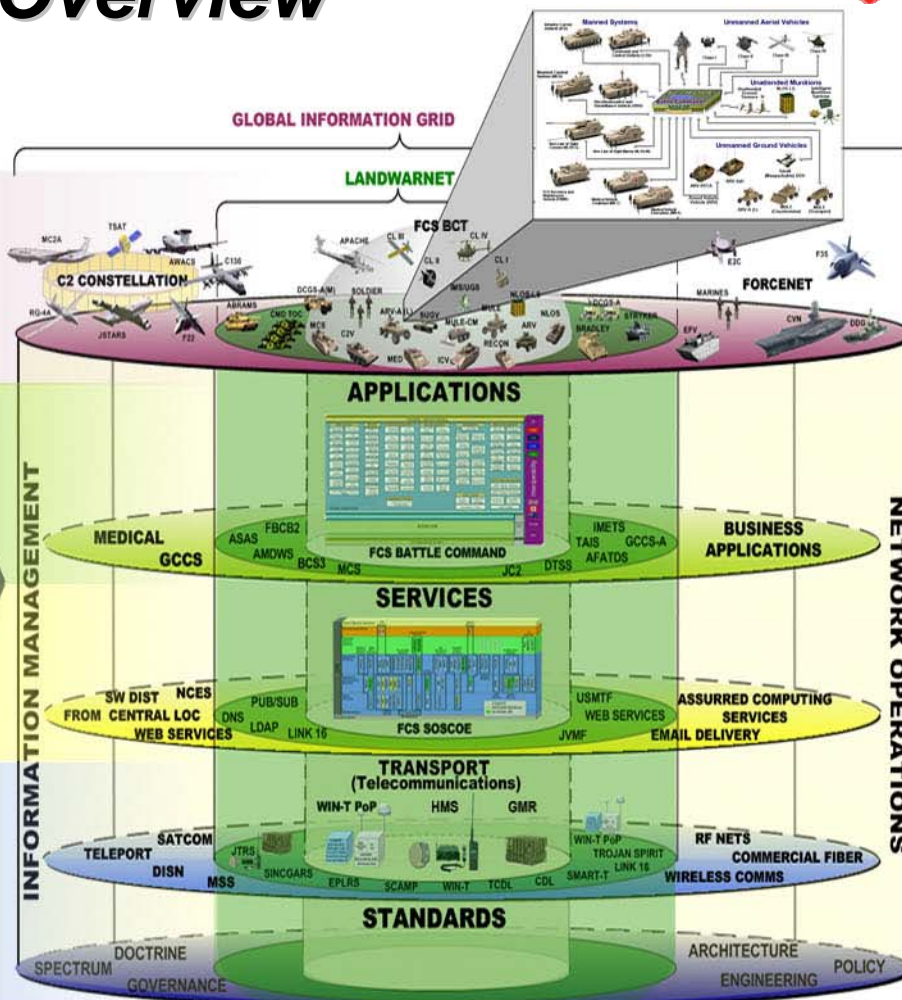
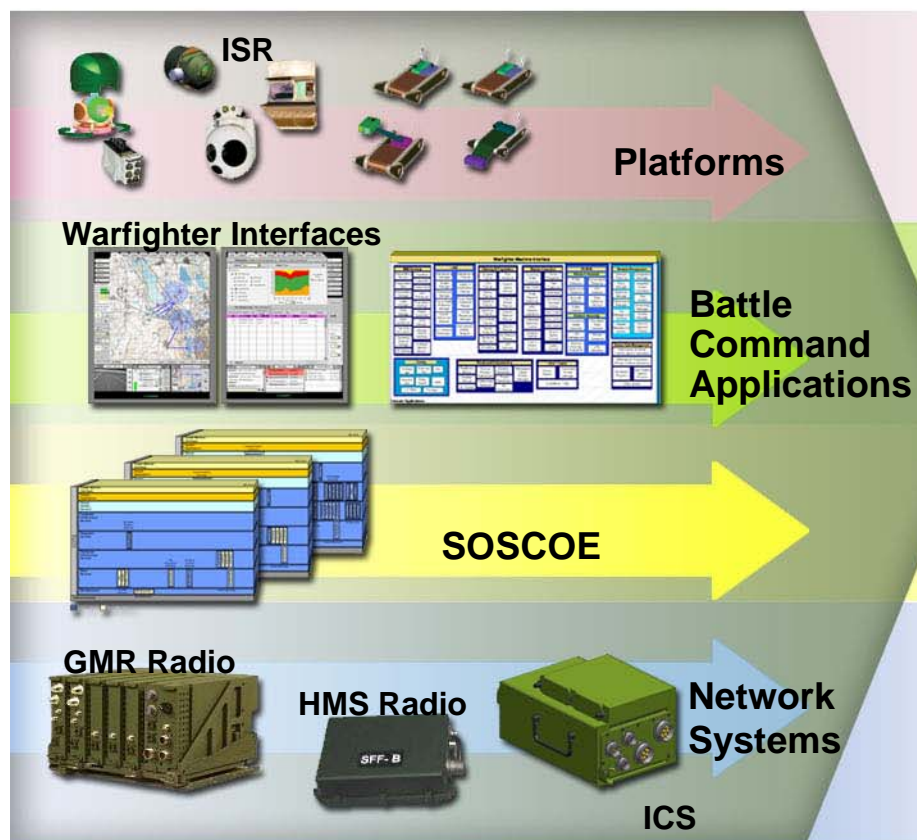
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# Net-Enabled Battle Command Network Overview



*Networked systems provide data/information from and to sensors, software, computers, telecommunications, and decision-makers*

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# ***Net-Enabled Battle Command***

## ***Some Definitions***



- **Command Net:** A communications network which connects an echelon of command with some or all it's subordinate echelons for the purpose of command and control. (*Ref: FM 1.02*)
- For the Net-Enabled Battle Command concept, we assume that all of the various systems/components of the network already meet the NR-KPP requirements, as called for by the Chairman Joint Chiefs of Staff Instruction (CJCSI) 6212.01D.

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# ***Net-Enabled Battle Command***

## ***Net-Centric Assumptions***



- The Joint-described tenets of Network-Centric Warfare is that networked forces will demonstrate:
  - Improved speed of command;
  - An improved ability to rapidly synchronize among themselves;
  - An improved ability to collect, process, and disseminate an uninterrupted flow of information; and
  - An improved ability to change over time.
- Systems are Net-Ready compliant

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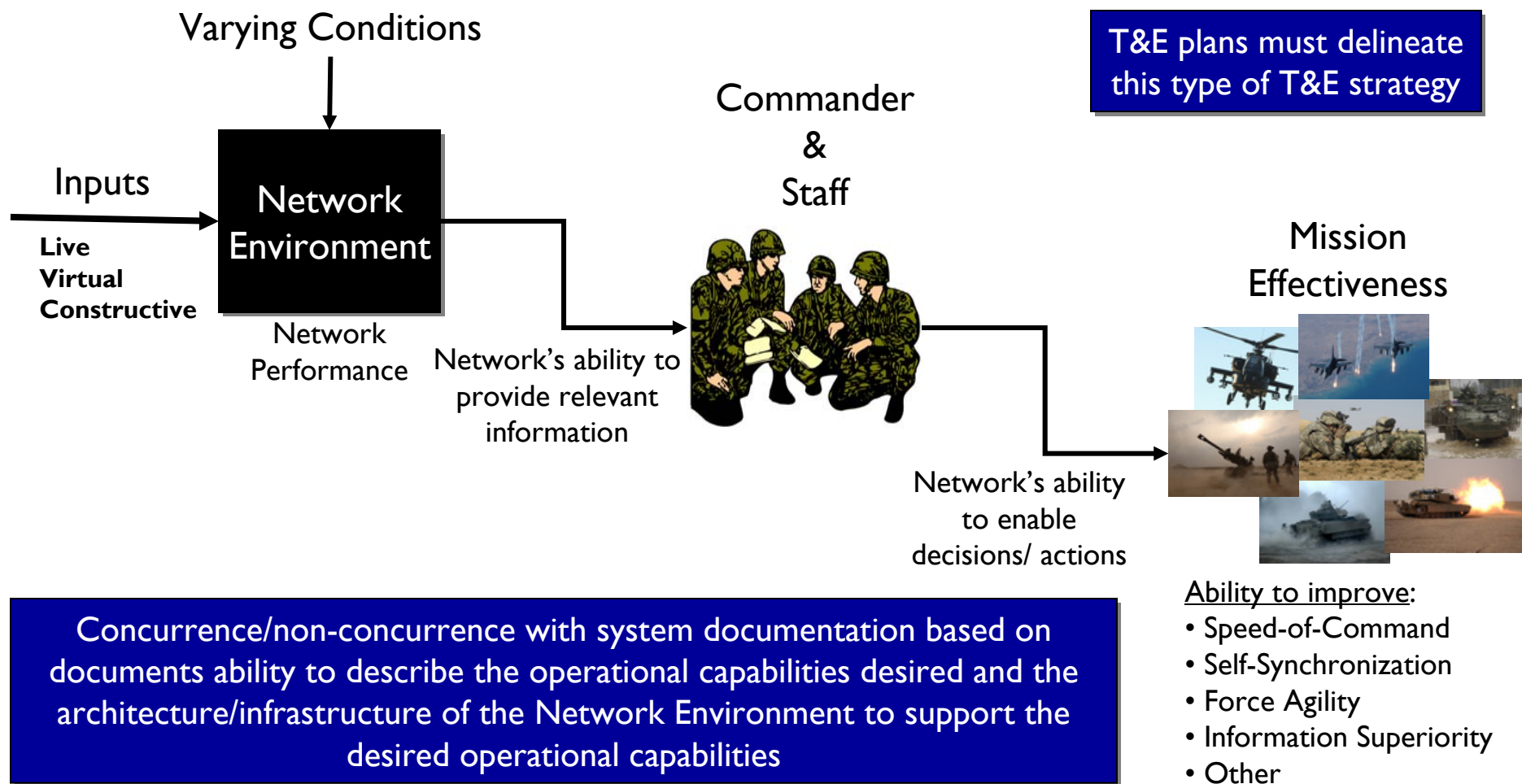




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# ***Net-Enabled Battle Command Capabilities-based Test and Evaluation***



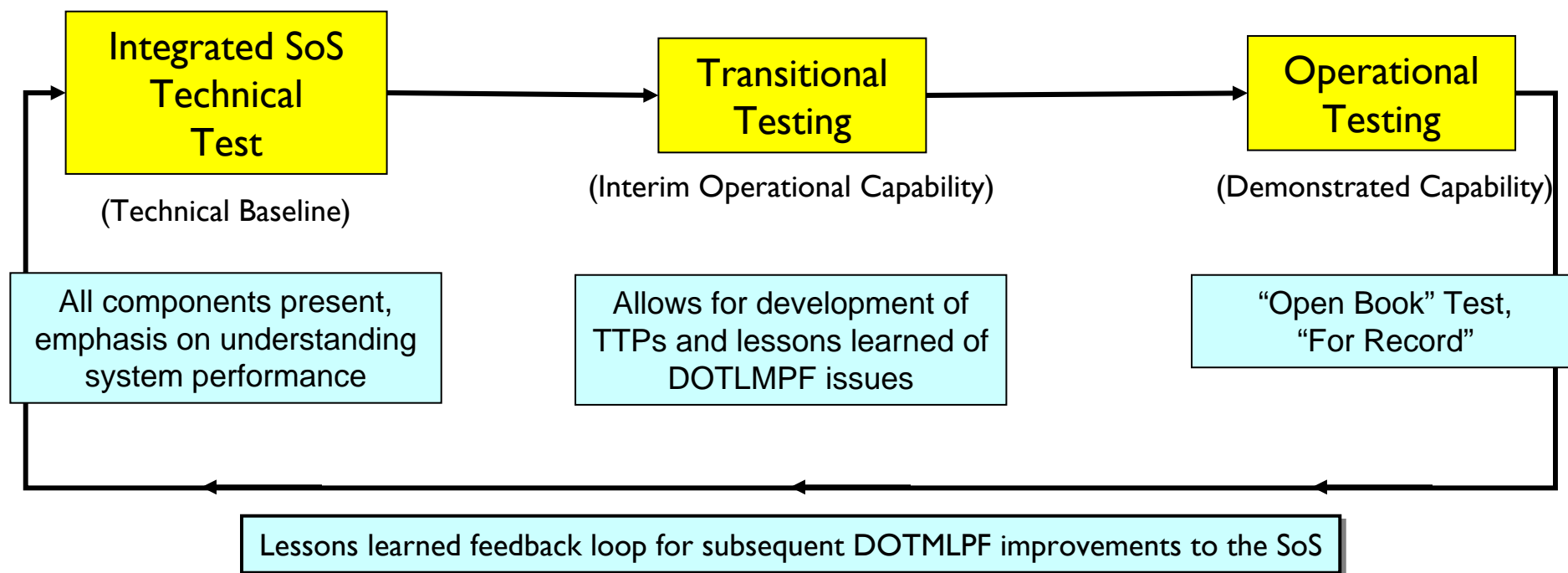
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# Net-Enabled Battle Command System-of-Systems T&E Events Concept



DT plan(s) focused on technical requirements, SoS Network performance, helping predict operational implications, and technical causality

OT plan(s) focused on operational performance, capabilities and limitations in accomplishing mission(s), force effectiveness, and DOTLPF

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# *Net-Enabled Battle Command Domains*



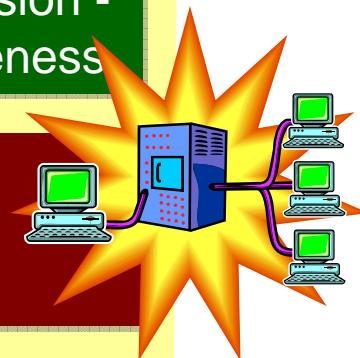
**Mission** – Domain where the net-enabled force/unit demonstrates the degree to which it is able to achieve the defined future force concepts/capabilities

**Cognitive** – Domain where decisions are made by the decision-maker; the place where perceptions, beliefs, values, understanding, and assessments takes place



**Information** – Domain where relevant information is created, manipulated, processed, stored, shared and presented to the decision - maker to convey commander's intent and enable situational awareness

**Physical** – Domain where the components of the network reside; sensor, platform, applications, operating systems, standards and transport infrastructure

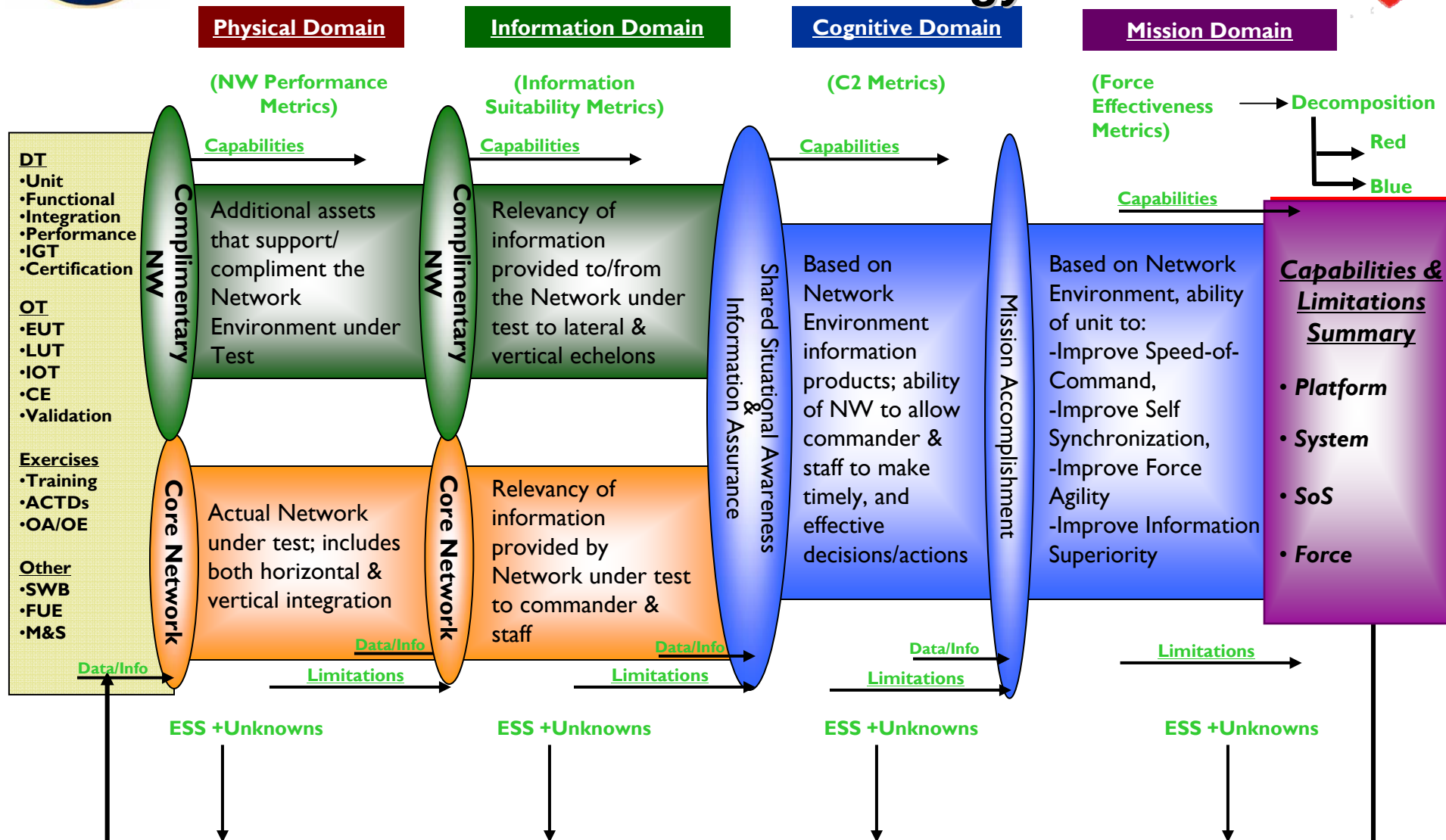




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# Net –Enabled Battle Command

## Overall T&E Methodology



IGT - Independent Government Test; EUT – Early User Test; LUT – Limited User Test; IOT – Initial Operational Test; CE – Continuous Evaluation; ACTD – Advanced Concept Technology Demonstration; OA/OE – Operational Assessment/Operational Evaluation; SWB – Software Blocking; FUE – First Unit Equipped; M&S – Modeling and Simulation; ESS – Effectiveness, Suitability, Survivability; NW – Network; C2 – Command and Control; FoS – Family of Systems; SoS – System of Systems

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# ***Mission Domain Metric Development Methodology***

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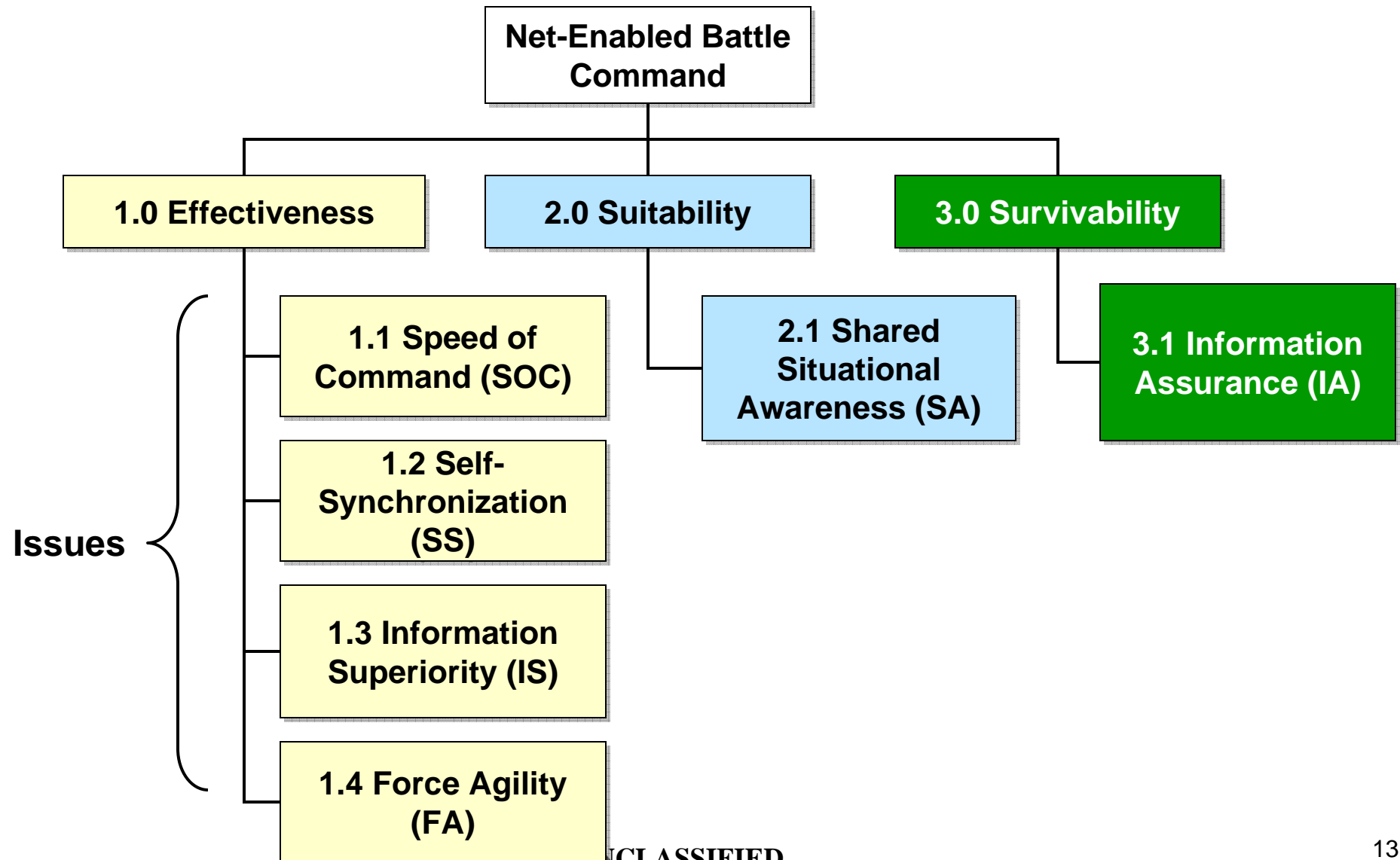




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# *Net-Enabled Battle Command*

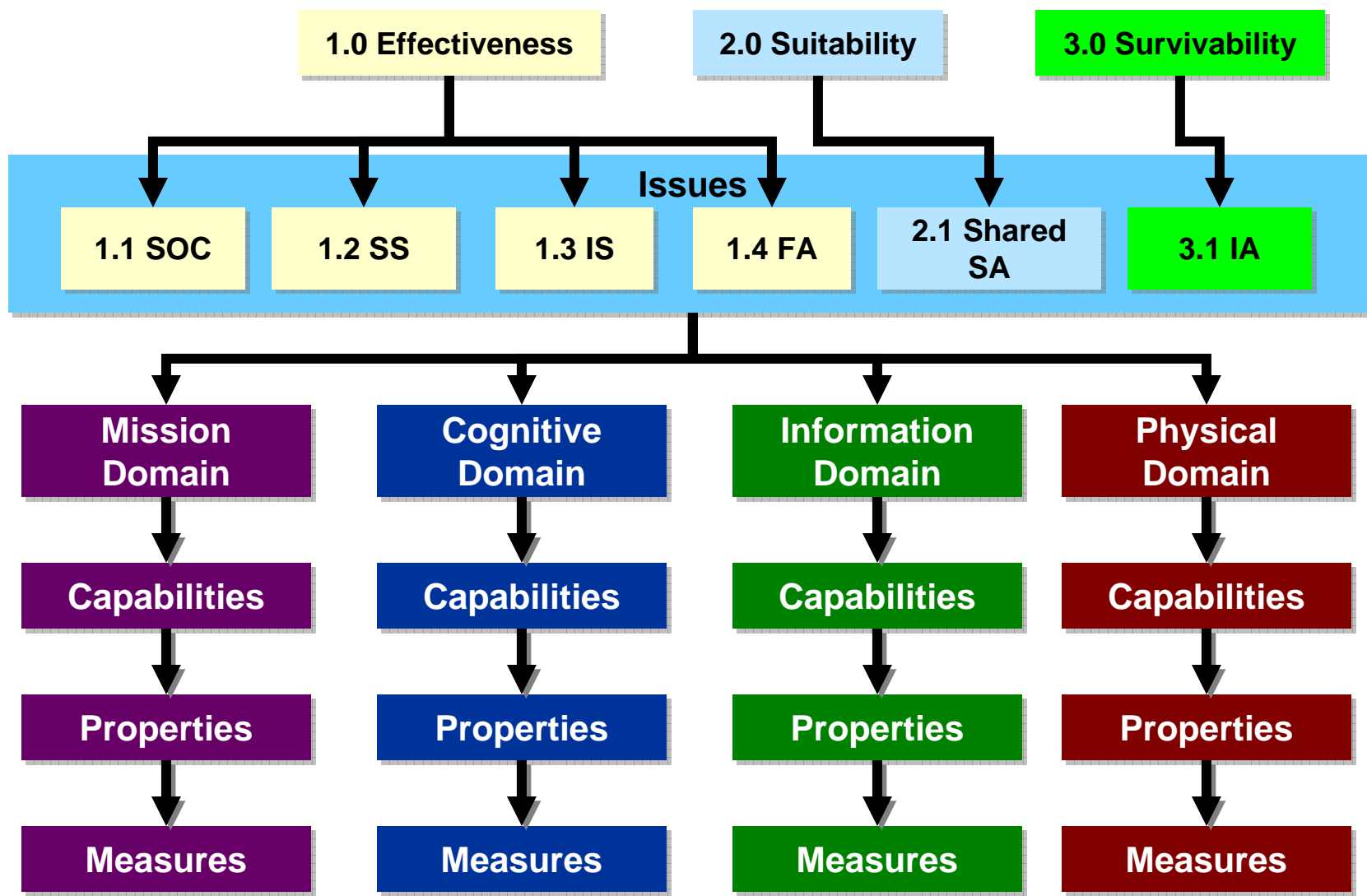
## *Evaluation Focus Areas*



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# *Net-Enabled Battle Command Methodology for Defining Measures*





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# Mission Domain Metrics

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# Speed-of-Command

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# Net-Enabled Battle Command Mission Methodology



## Speed of “Firsts”

Speed of Command, described by the OODA Loop, assesses the rapidity which you go from 1 – 4

In addition, each component of the OODA loop, O-O-D-A, assesses the time to complete each individual “first”

Assessments based on:

- JIM forces vs. Threat
- System maturity comparison (roi)

1. See First

2. Understand First

3. Decide First

4. Act First

5. Finish Decisively

Assessments based on:

- Mission success
- Commander’s intent
- Task/mission requirements

*“Did I impose my will on the enemy”*

## Quality of “Firsts”

Information Superiority

Self-Synchronization

Force Agility

Assessments based on:

- JIM forces vs. Threat
- System maturity comparison (roi)

## Battle Command Information Need Categories:

JIM forces status, Threat status, Terrain information, Weather information

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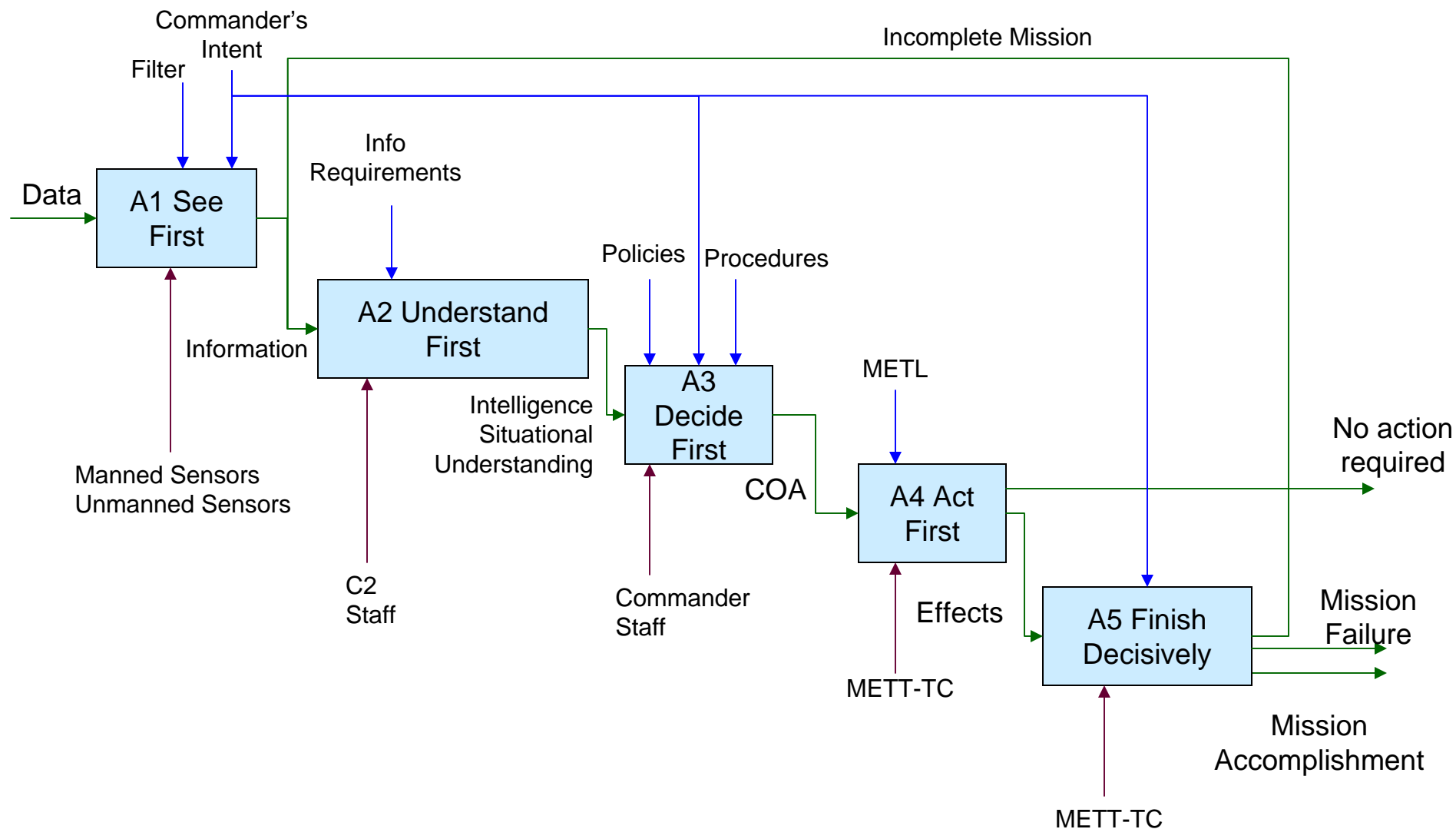




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# NEBC Activity Model (OV-5)



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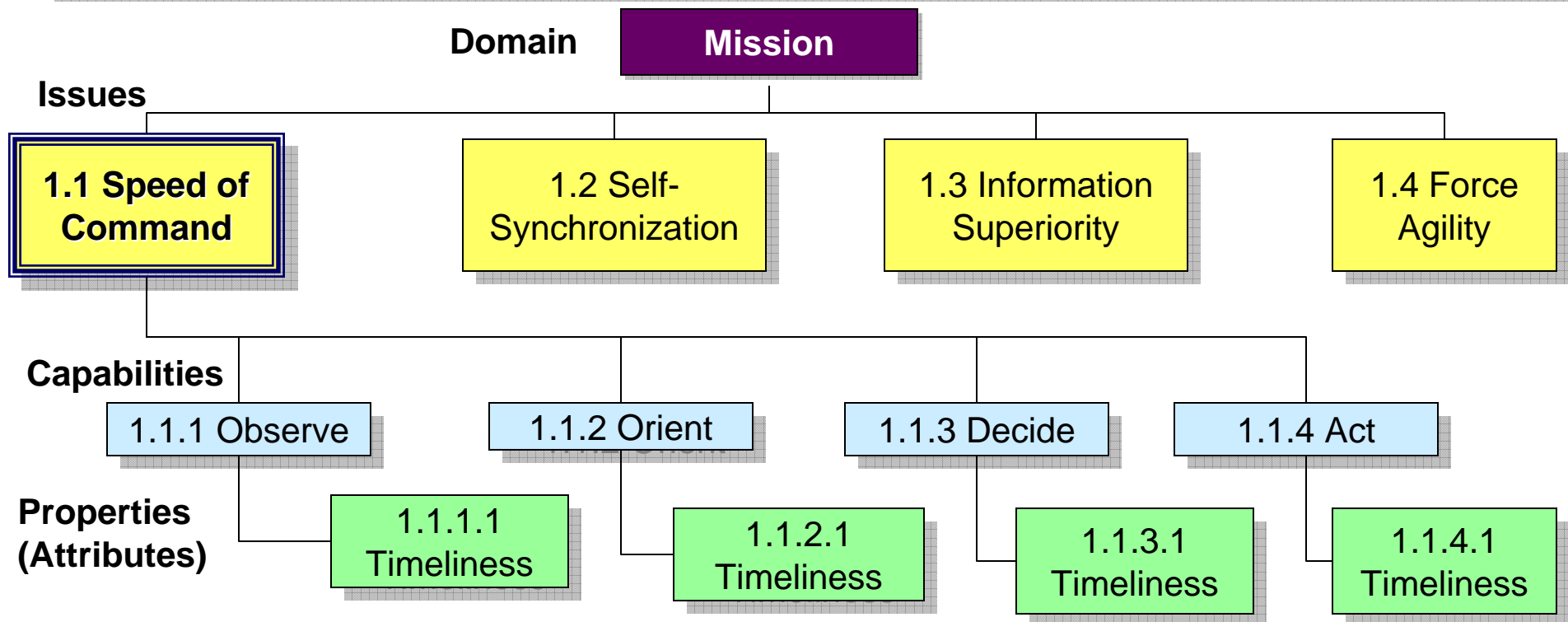
# Objective of Mission Domain:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability



## Definition of Speed of Command:

- ❖ Time required to complete one full cycle of Boyd's observe-orient-decide-act (OODA) loop  
(Ref: *Network-Centric Warfare – Its Nature and Modeling*, Fewell, M.P and Hazen, Mark G.)



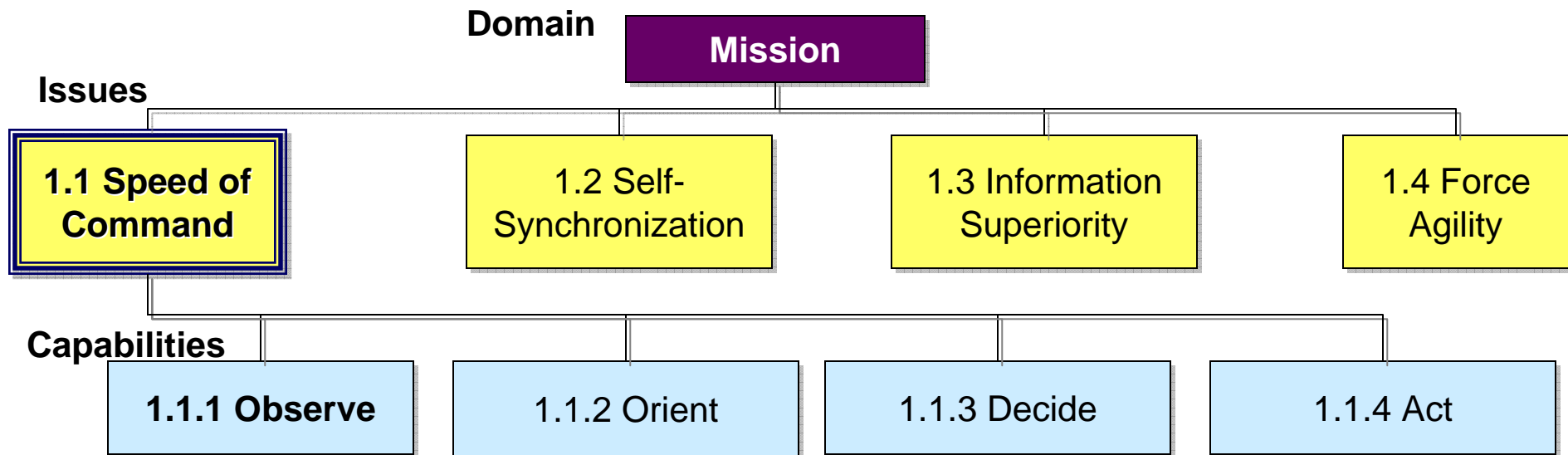
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# Objective of Mission Domain:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability



## Definition of Observe:

- ❖ The act of (*time to*) collecting information. Sometimes the commander actively seeks information; sometimes the command and control (C2) system disseminates it to them. (Ref: FM 6-0)
- ❖ (*Time*) To learn about the status of their forces, the environment and the enemy through intelligence, surveillance, reconnaissance, information systems and reports from other headquarters (Ref: FM 6-0)
- ❖ An act (*Time*) to discern a target visible to a sensor (human or machine) that may be within range of available weapons. (Ref: FM1-02, see definition for Target of Opportunity)

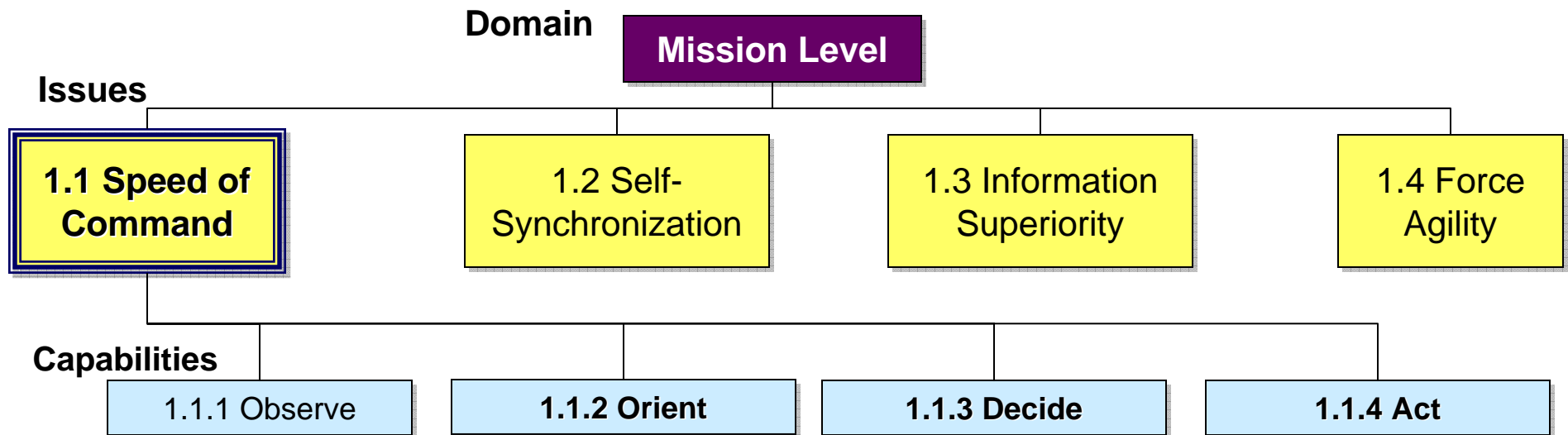
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# Objective of Mission Domain:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability



## Definition of Orient:

How (long to become) familiar with or adjusted to facts, principles, or a situation *is the force* (Ref: *Freedictionary. com*)

## Definition of Decide:

Timeliness of selecting a course of action as the most favorable to accomplish the mission (Ref: *FM 6-0, FM 1-02*)

## Definition of Act:

Time to put decisions into action by disseminating it through execution information – orders or plans; supervising to ensure proper execution and assessing results through feedback from COP and staff running estimates; synchronize and integrate BOS as well as directing execution within the higher commander's intent. (Ref: *FM 6-0*)



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# Self-Synchronization

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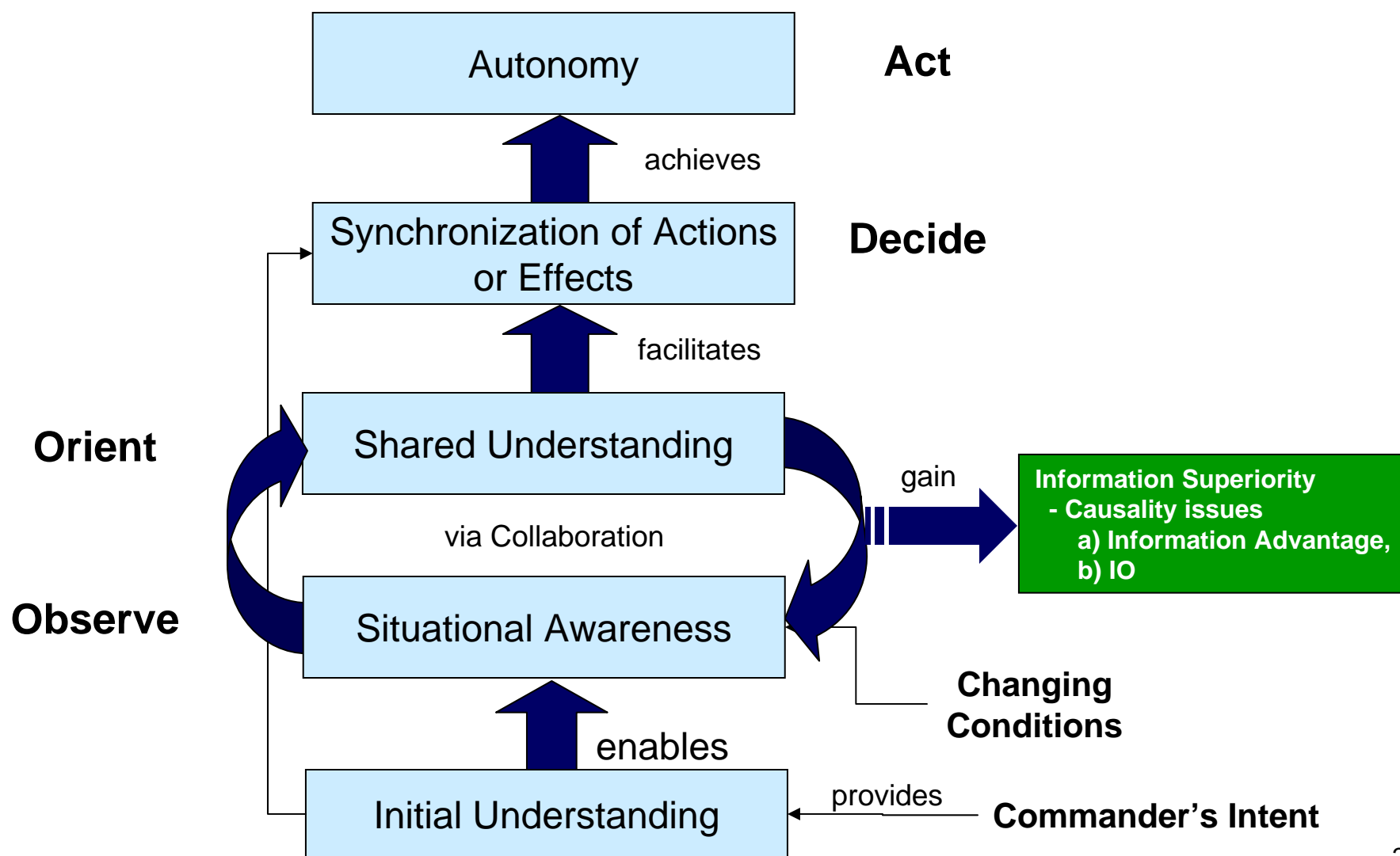




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# Self Synchronization





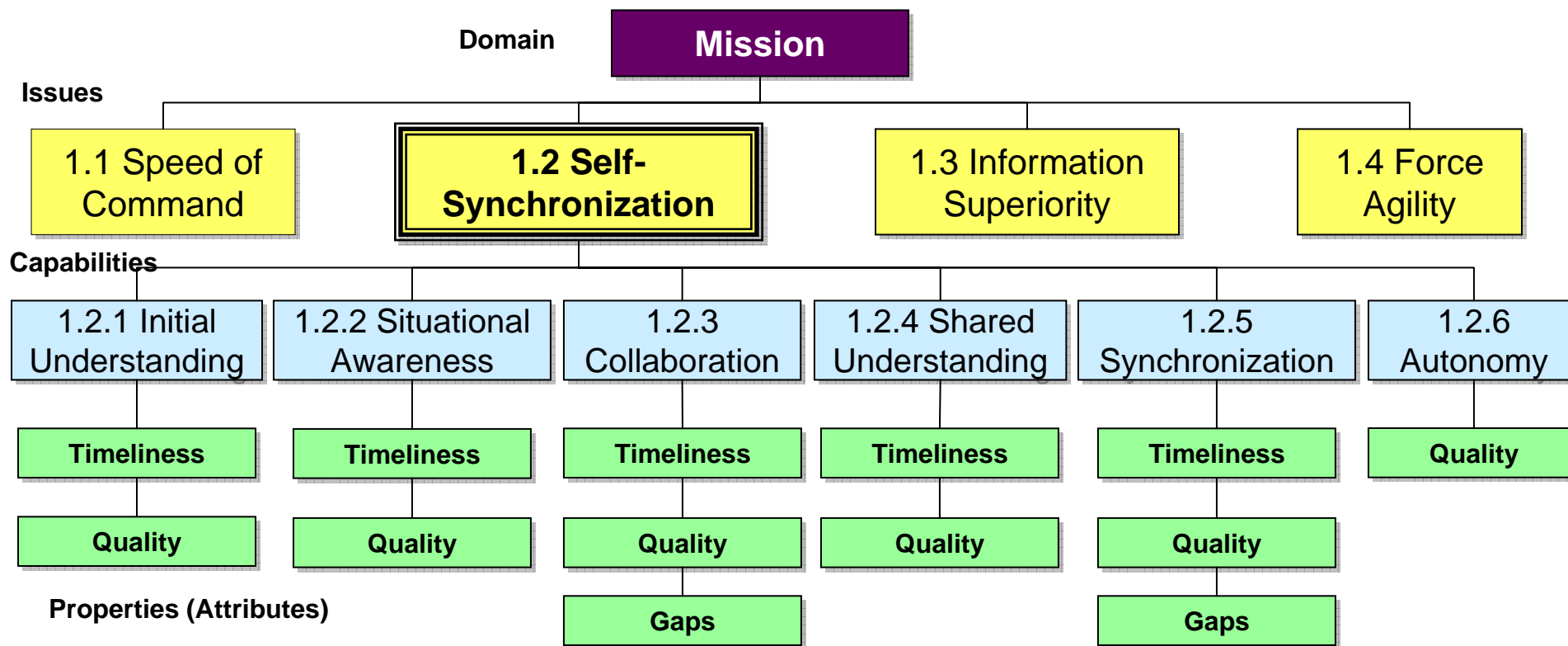
# Objective of Mission Domain:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability



## Definition of Self-Synchronization:

❖ Ability of entities to rapidly synchronize among themselves, independent of direction from superiors (Ref: *Network-Centric Warfare – Its Nature and Modeling*, Fewell, M.P and Hazen, Mark G.)

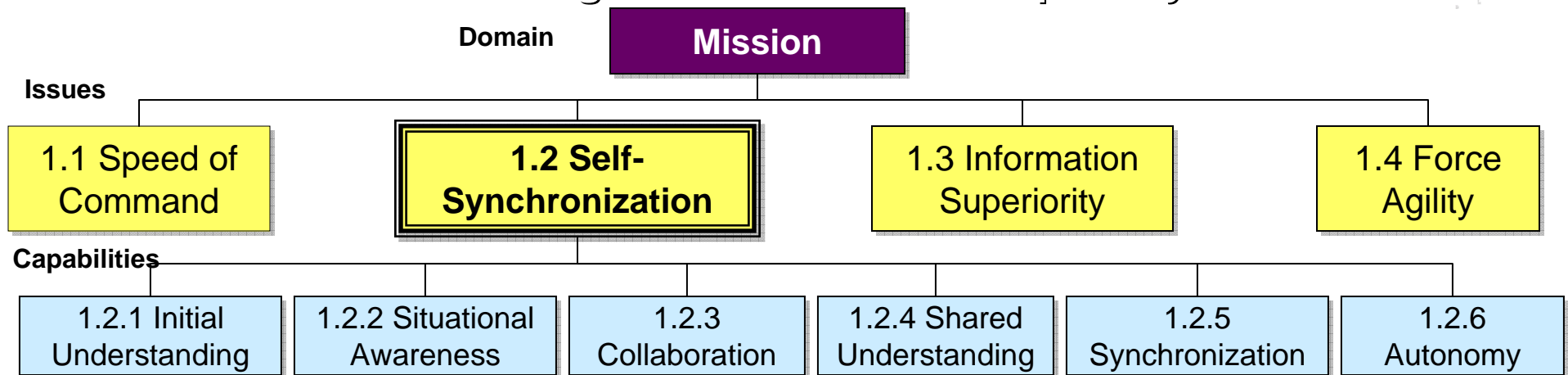


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# Objective of Mission Domain:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability



## Definition of Initial Understanding:

- ❖ *Time for and degree that all subordinate commands have higher commander's plan(s) and intent?*

## Definition of Situational Awareness:

- ❖ *Time for knowing who's where and what are they doing? (Ref: JFC)*
- ❖ *The quality of perception of relevant elements in the environment, the comprehension of their meaning and the projection of their status in the near future. (Ref: Endsley)*

## Definition of Collaborate:

- ❖ *Given the network, how well can subordinate entities work together to plan and execute missions and tasks?*

## Definition of Shared Understanding:

- ❖ *Time for subordinate commands to gain and the quality of common understanding of a situation*

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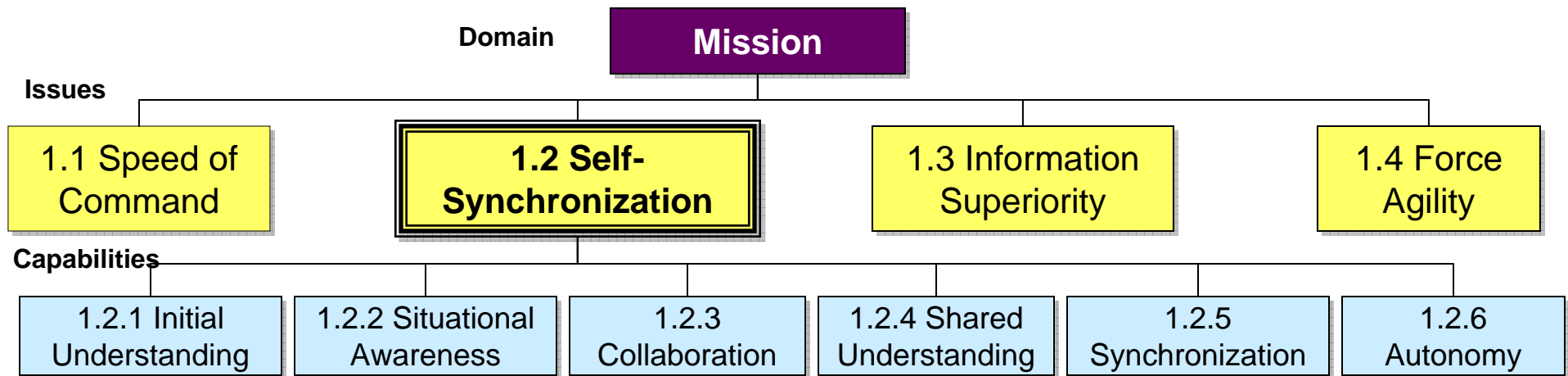
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# Objective of Mission Domain:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability



## Definition of Synchronization:

- ❖ The *time required* to arrange military actions in time, space and purpose to produce *maximum (precise)* relative combat power at a decisive place and time. (Ref: FM 3-0)
- ❖ *Time to* arrange military actions by forces and BOS in time, space and purpose to produce maximum *(precise)* relative military power at a decisive place and time. (Ref: FM 6-0)

## Definition of Autonomy:

- ❖ Successfully conducting military operations through decentralized execution based on mission orders for effective mission accomplishment (Quality)
  - ❖ Degree of independency in making decisions
  - ❖ *Success of conduct(ing)* military operations through decentralized execution based on mission orders for effective mission accomplishment.

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# Information Superiority

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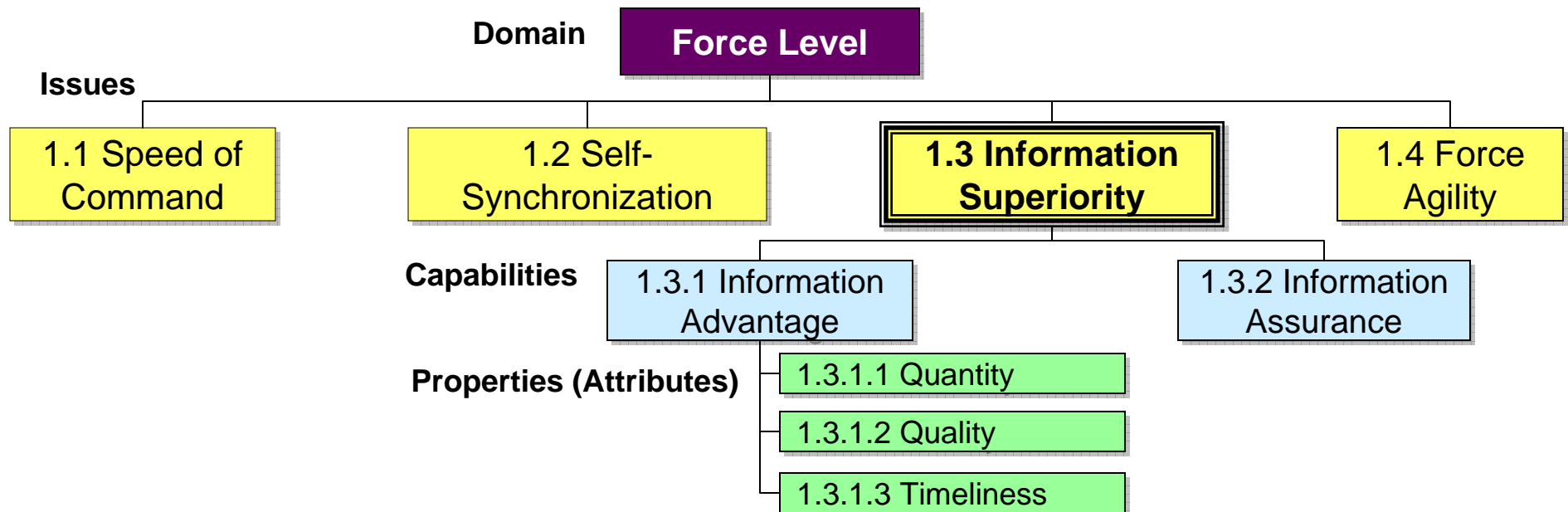


# Definition of Force Level:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability

## Definition of Information Superiority:

- ❖ The operational advantage derived from the ability to collect, process, and disseminate an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same. (FM 3-0)



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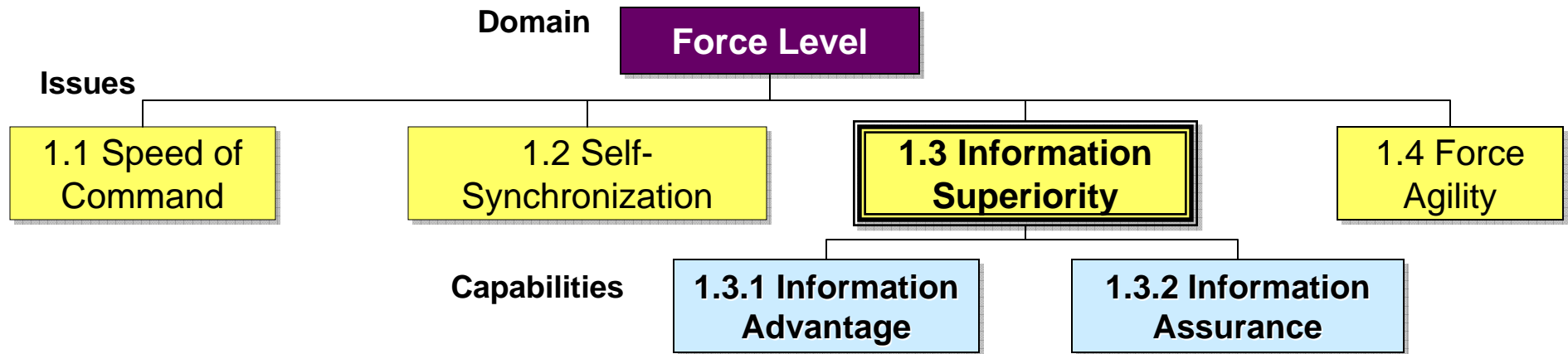
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# Definition of Force Level:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability



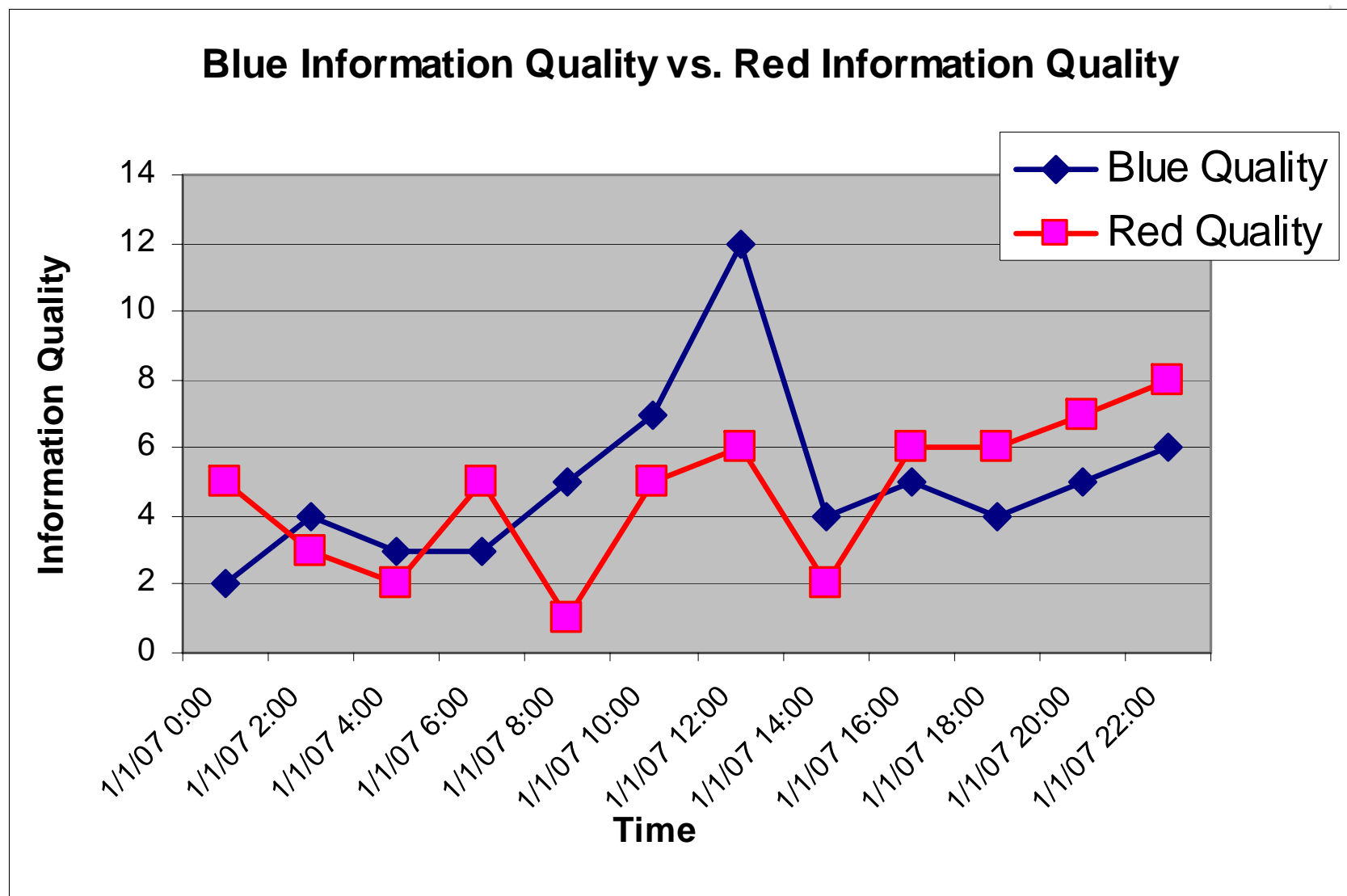
- **Information Advantage:** The ability of one opponent to answer his information needs at a rate greater than his adversary can answer his information needs.
- **Information Assurance:** Measures that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation. This includes providing for restoration of information systems by incorporating protection, detection, and reaction capabilities.



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## I-3 Information Superiority Measures



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# Force Agility

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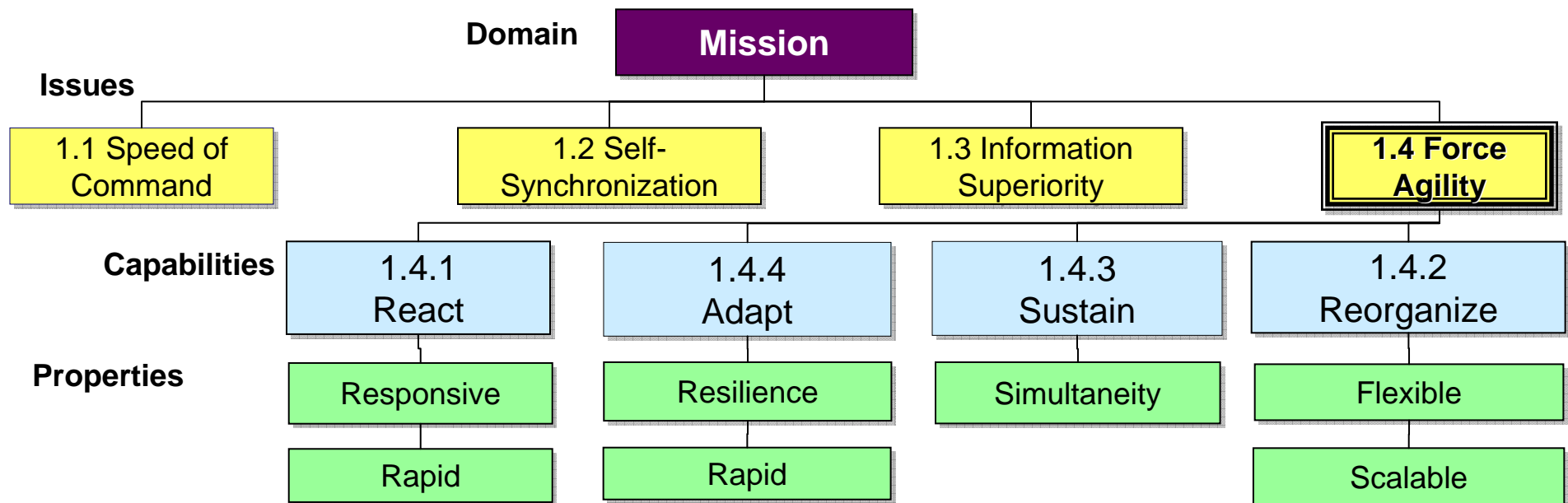
# Definition of Mission:

Demonstrated ability of net-enabled forces to achieve some degree of future force capability



## Force Agility

- ❖ A responsive, agile force package is one that is sustainable and mobile enough to accomplish the mission. (FM 3-0)
- ❖ Ability of a force to rapidly react to changing conditions, especially regarding unplanned and ad-hoc circumstances, and revise its organization to handle them; Ability to alter the nature of engagement quickly (adapt) and the ability to sustain several types of engagement simultaneously, as required.
- ❖ Agility implies an ability to change over time. (Ref: Network Centric Operations Conceptual Framework)



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# Definition of Mission:

**Demonstrated ability of net-enabled forces to achieve some degree of future force capability**



## Definitions of Force Agility Properties

### **Responsiveness**

❖ The degree to which decisions and actions are timely and relevant. (*NCE JFC 1.0*) Responsiveness is a function of timeliness and relevance.

### **Resilient**

❖ The extent to which recovery or adjustment is achieved given misfortune or change. (*NCE JFC 1.0*)

- ❖ Recovery – Reestablishment of the baseline prior to a given misfortune or change

### **Scalable**

❖ The extent to which organizations can seamlessly adjust size and scope to meet a given mission requirement. (*NCE JFC 1.0*)

### **Simultaneity**

❖ The extent to which engagements occur at the same moment (*Modified from Houghton Mifflin Company*)

### **Sustainment**

❖ The extent to which an engagement maintains and prolongs operations or combat until successful accomplishment or revision of the mission. (Modified from CJCSI 3170.01E)

### **Flexible**

❖ The extent to which individuals and organizations dynamically meet mission requirements. (*NCE JFC 1.0*) (*See Cognitive measures*)



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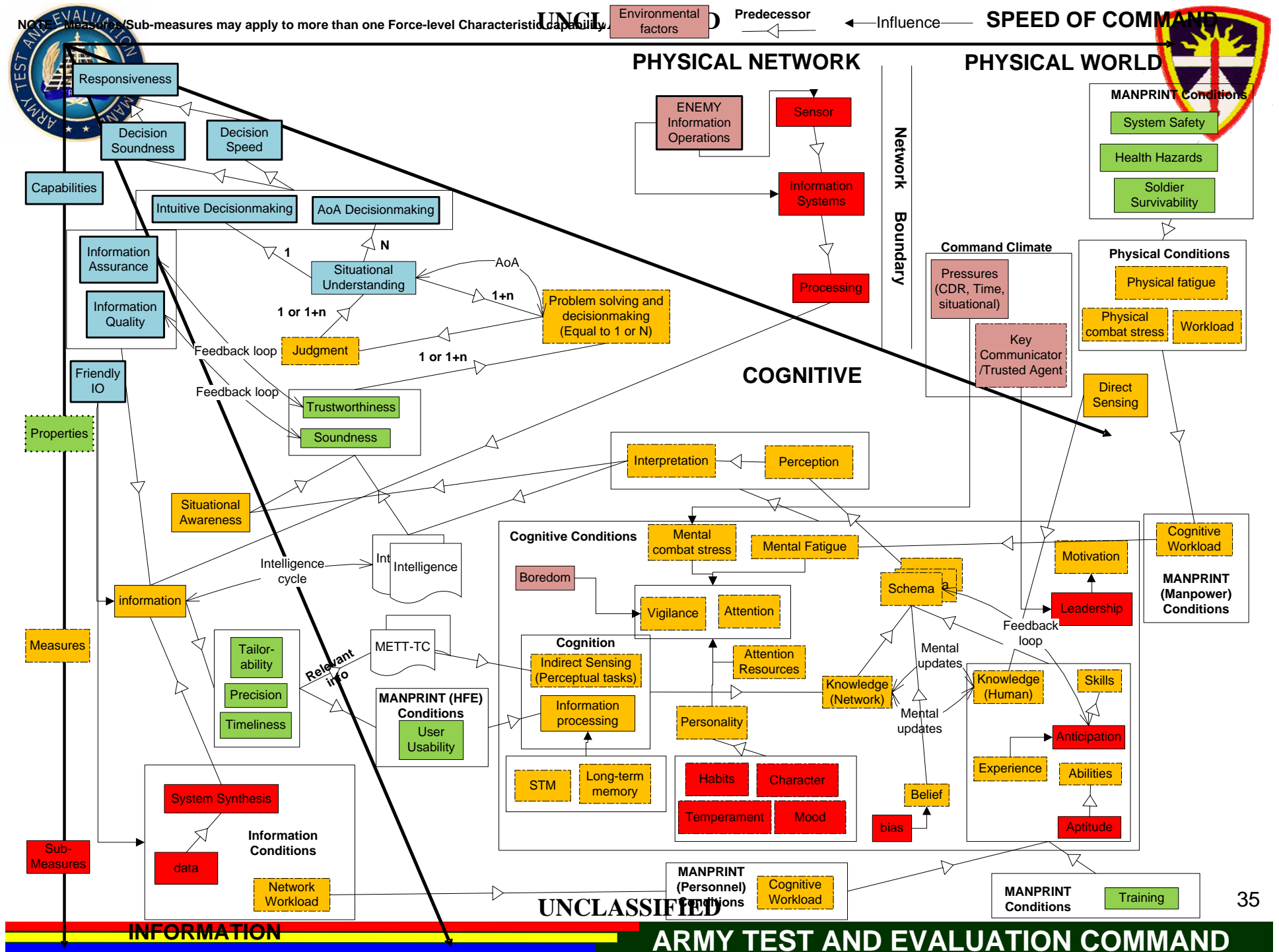
# Cognitive Domain

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## ***Back Up Slides***

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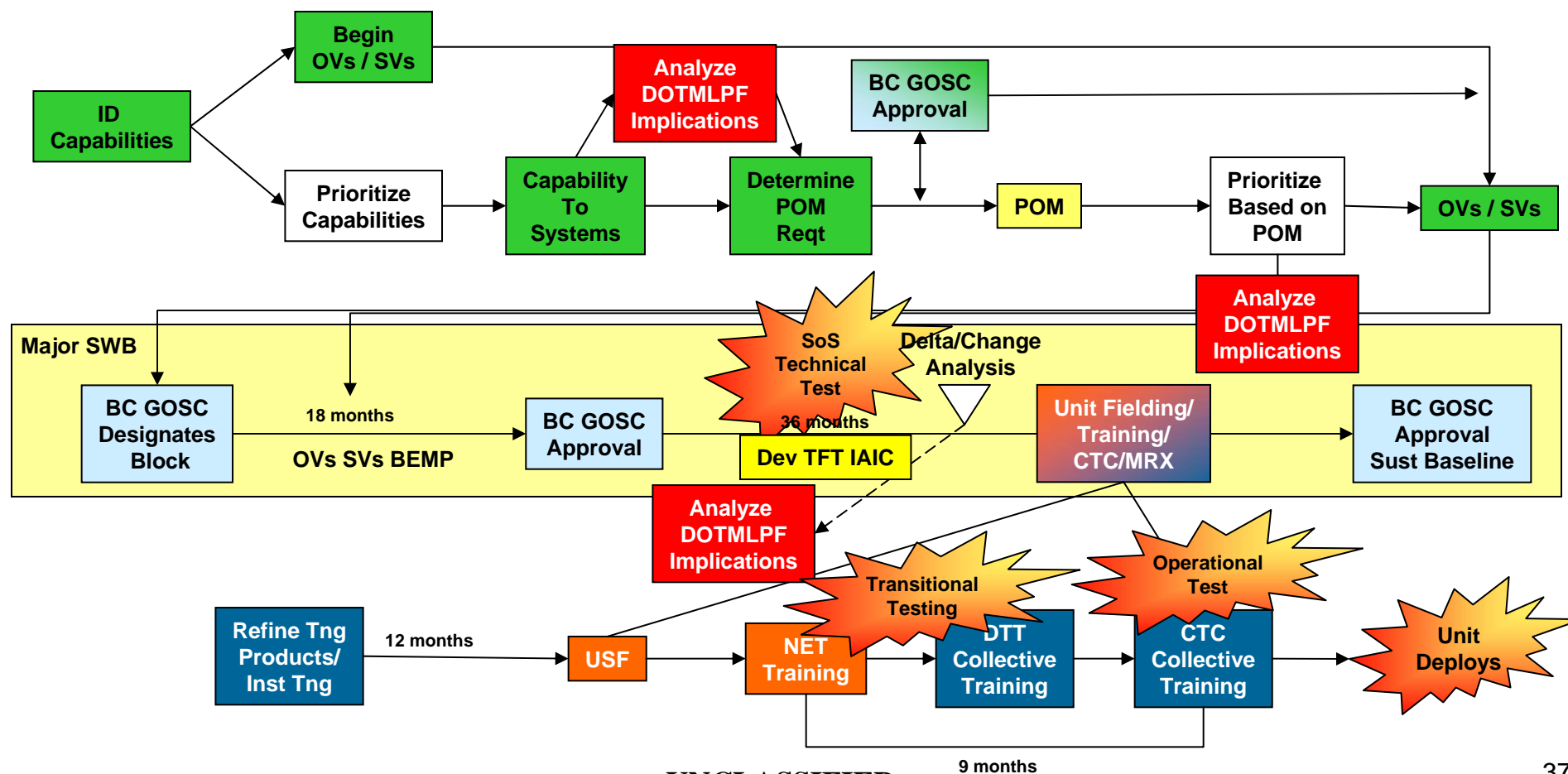
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# Net-Enabled Battle Command Integrated SoS T&E Cycle



LandWarNet Warfighter Mission Area (WMA) Integrated Working Group (IWG), Transition Sub-Working Group (TWG) Mission:

- Set the conditions for units to be successfully deployed (trained and ready)
- Identify and document issues that may impact the successful readiness for each rotation



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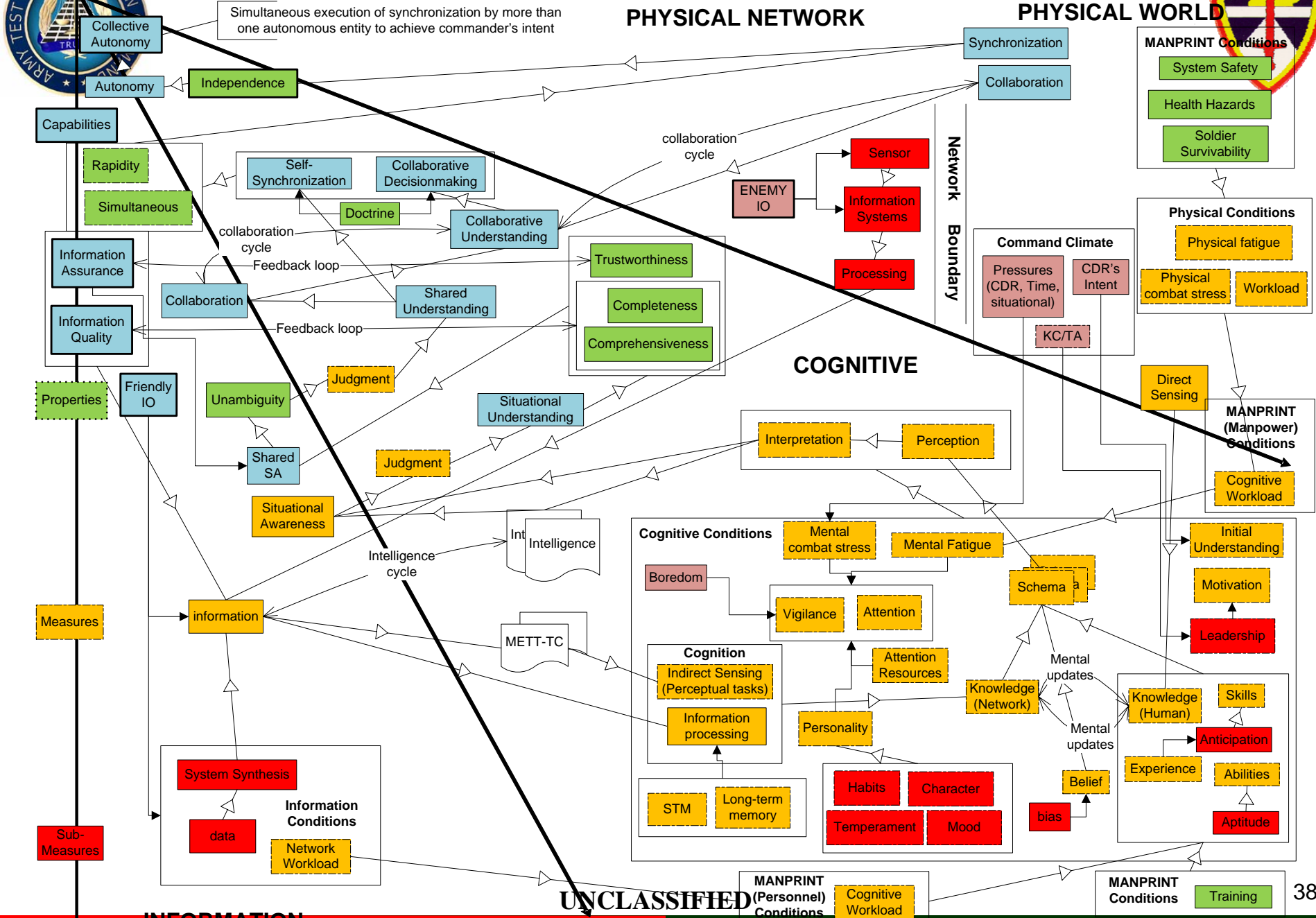


Environmental factors

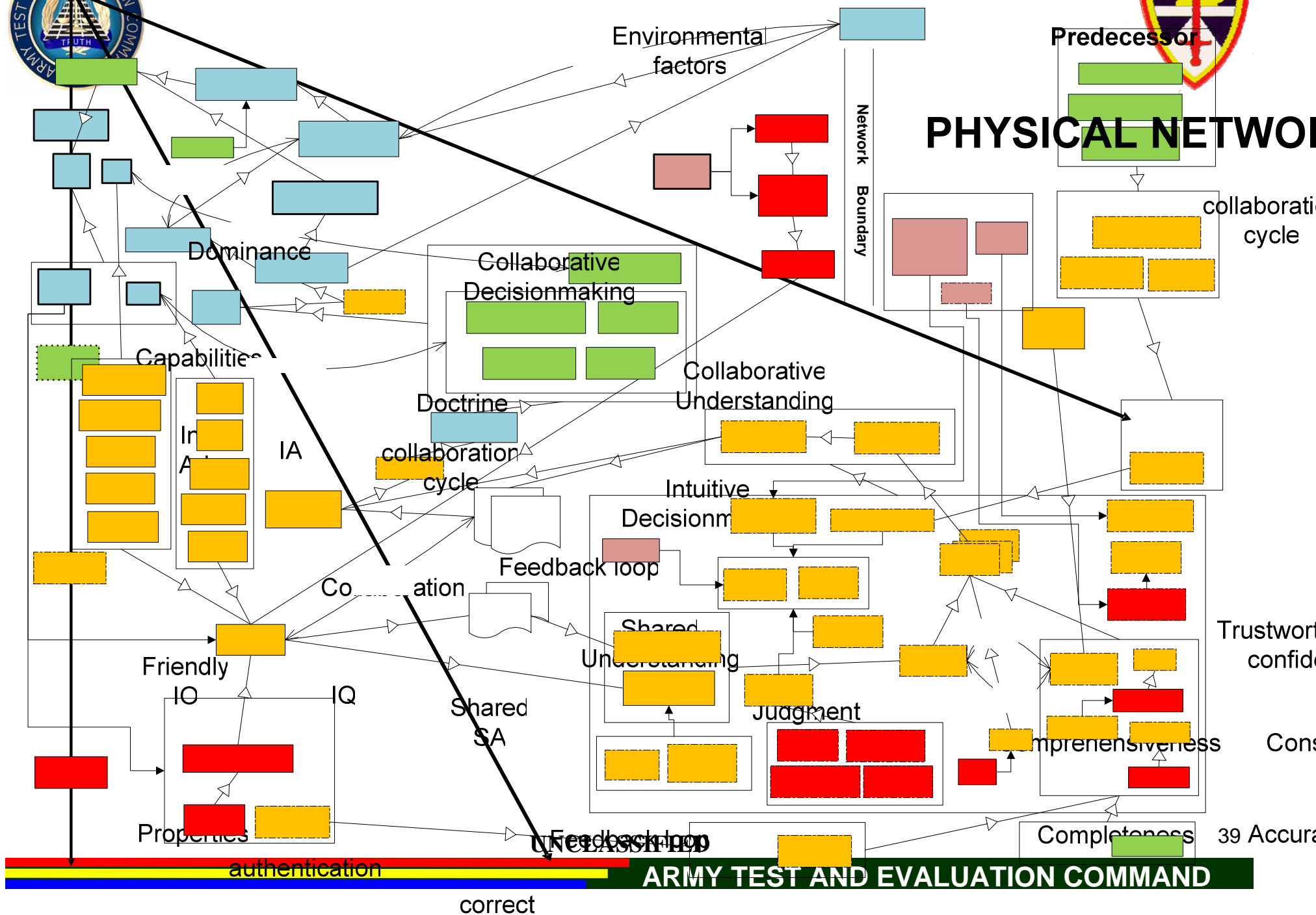
Predecessor

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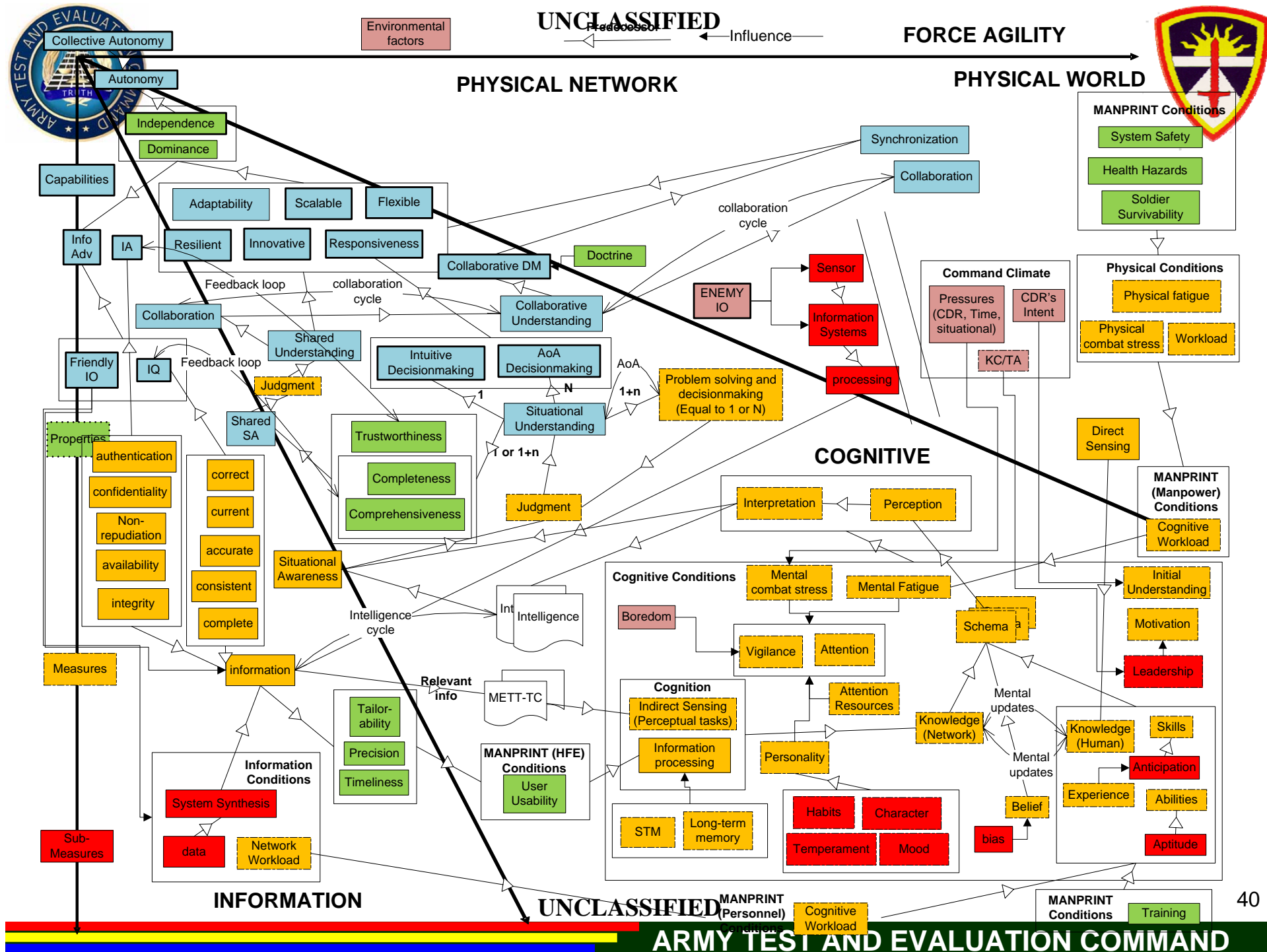
SELF-SYNCHRONIZATION



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