Reclaiming Rapid Cognition

Improving Decision-making in Command and Control Agencies by Understanding and Enabling Rapid Cognition

Presentation 206

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From Operation Enduring Freedom

- Austere, Mobile Environment

To Operation Iraqi Freedom

- Stationary, Data Heavy Environment

Effects of Technology

- Battlefield Picture in Real Time
- Can see individual units
- Faster Communications
- Demand for constant updates
- Demand for immediate response to senior's requests

Reclaiming Rapid Cognition Overview

- What is Rapid Cognition?
- Training Rapid Cognition Decision-Makers
- Getting Back to Basics—Enabling the Executors
- Why it Matters What Our Architecture Looks Like
- Leadership as a Network Property
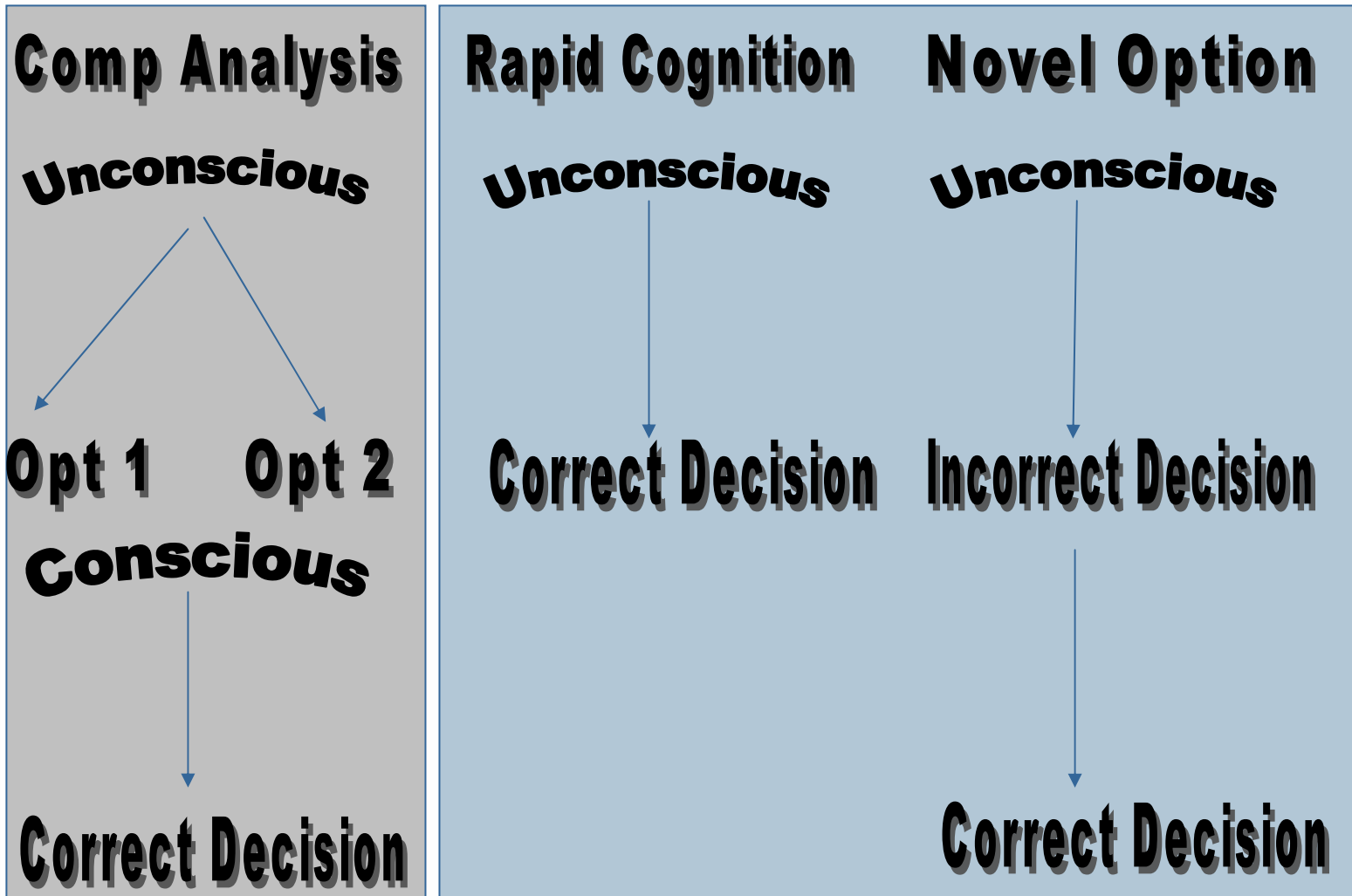
What is Rapid Cognition?

"I see only one move ahead, but it is the correct one."-Jose Raul Capablanca, Chess Grandmaster

Deciding Advantageously Before Knowing the Advantageous Strategy (1997)
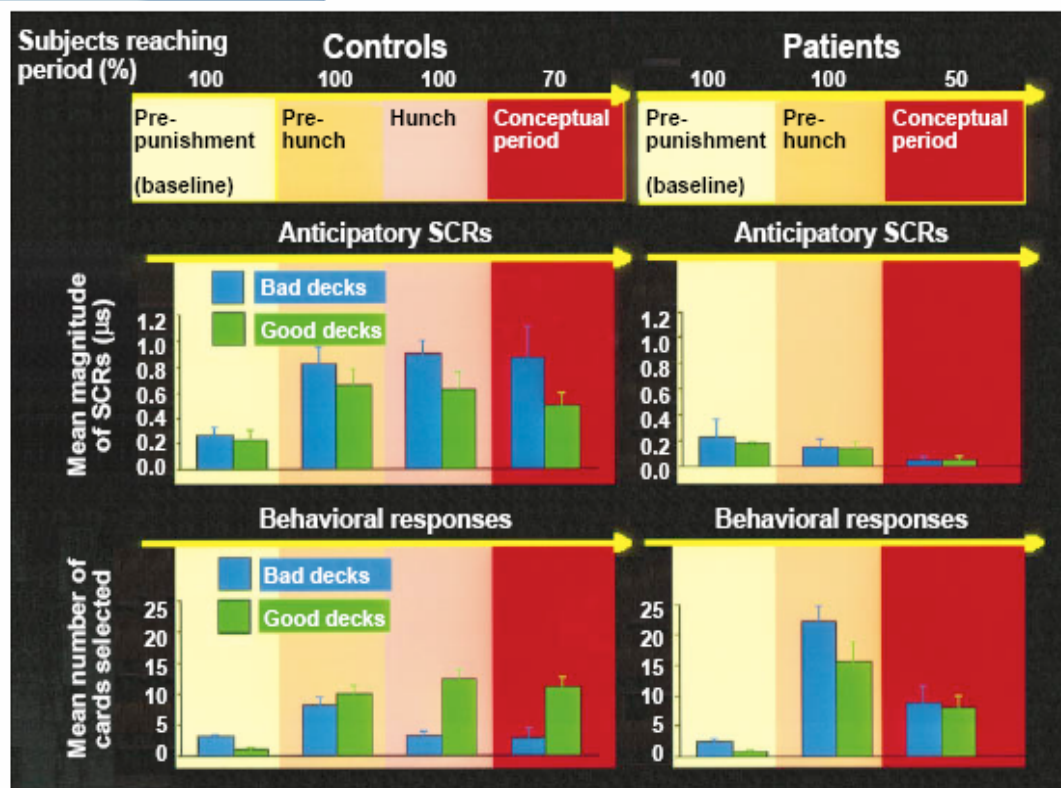
- Rigged Decks
- From cards 10-20, after few losses, anticipatory SCRs
- By card 50, subjects had hunch
- By card 80 subjects could verbalize strategy
- Subjects began to choose advantageously before they realized which strategy worked best

Two Types of Decision-Making

Comp Analysis

Unconscious

Opt 1   Opt 2

Conscious

Correct Decision

Rapid Cognition

Unconscious

Correct Decision

Novel Option

Unconscious

Incorrect Decision

Correct Decision

Rapid Cognition Decision-Making in Experts

- Experts have training and experience to both read situation and act correctly
- Can diagnose errors in their solutions sooner

Training Rapid Cognition Decision-Makers

"Yet this belief in the importance of innate talent, strongest perhaps among the experts themselves and their trainers, is strangely lacking in hard evidence to substantiate it . . . The preponderance of psychological evidence indicates that experts are made, not born." –Philip E. Ross

Training the Components

- Knowledge Bank
  - Academic knowledge
- Experiential Knowledge
  - Allows the organization of knowledge
- Simulation Training
  - Identifies problems
  - Overcomes stress reactions

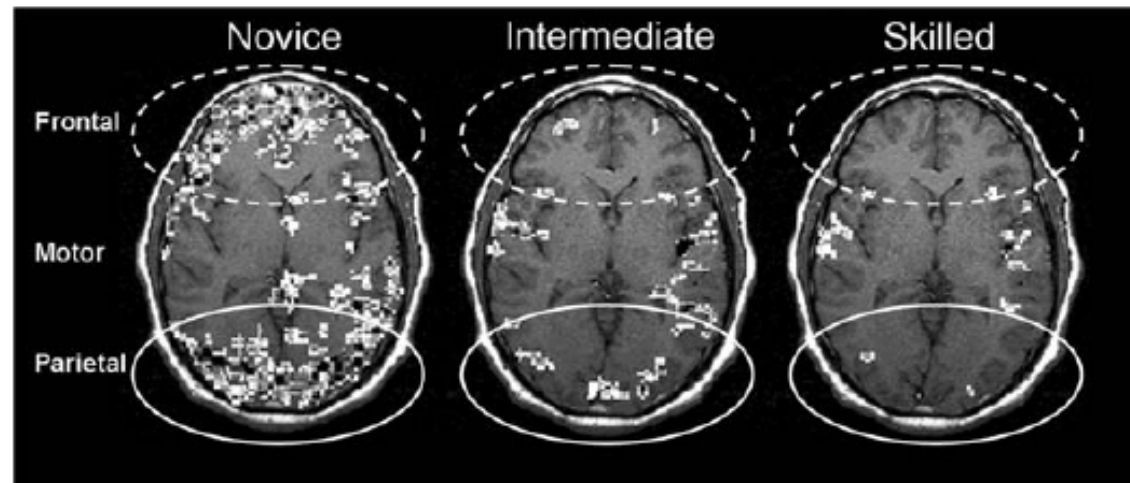# Experts don't know significantly more, they just access it more efficiently

Figure 37.1. Activation of the brain, as a function of practice, in three periods of learning a motor tracking task. This is a maximum projection image, with white areas showing the activation of any cortical area either above or below the illustrated brain slice. The image is an axial (aerial) view of the head, where the top of the image corresponds to the front (nose) of the head and the bottom corresponds to the back of the head. The frontal areas (dashed ellipse) and parietal attention control areas (solid ellipse) show dramatic reductions in activation. The motor areas (middle of images) shares fairly preserved activation.

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Getting Back to Basics—Enabling the Executors

"You've got to let people work out the situation, work out what's happening. The danger in calling is that they'll tell you anything to get you off their backs, and if you act on that and take it at face value, you could make a mistake. Plus, you are diverting them. Now they are looking upward instead of downward. You're preventing them from resolving the situation." –LtGen Paul VanRiper, USMC Retired

Thinking Too Much: Introspection Can Reduce the Quality of Preferences and Decisions (1991)

- Introspecting about decisions to take psych courses caused students to weight information in a less than optimal way and to make less optimal choices.

Table 4

Courses Preregistered for and Actually Taken

Variable	Control	Reasons	Rate all
		Condition	
Preregistration			
Highly rated courses	.41	.15	.21
Poorly rated courses	.04	.10	.01
Actual enrollment			
Highly rated courses	.37	.21	.24
Poorly rated courses	.03	.08	.03

Note. Subjects were assigned a 1 if they registered for or actually took a course and a 0 if they did not register or take a course.

Effects of Verbal Descriptions

- Brown hair
- Deep set eyes
- Oblong, angular face
- Dimples
- Large cheeks
- Pronounced chin
- Fair complexion

# The Verbal Overshadowing Effect: Why Descriptions Impair Face Recognition (1997)

Table 1
Recognition and Recognition Weighted by Confidence Scores for Experiment 1

	Percentage Correct Recognition	Recognition × Confidence Scores	SE
Self-paced test			
Control	80	4.95	.39
Verbal	65	4.20	.51
Speeded test			
Control	70	4.30	.38
Verbal	35	3.20	.37
Two-choice			
Control	65	4.25	.51
Verbal	55	3.85	.49
Ignore			
Verbal	45	3.30	.45

Table 2
Recognition and Recognition Weighted by Confidence Scores for Experiment 2

|	Percentage Correct Recognition	Recognition × Confidence Scores	SE
Control	65	4.38	.35
Describe parent	53	3.63	.34
Verbal			
Self-paced	53	3.72	.33
Ignore	38	3.23	.30
Provide			
Self-paced	45	3.48	.31
Ignore	63	4.15	.30

Why It Matters What Our Architecture Looks Like

"Networks have properties hidden in their construction, that limit or enhance our ability to do things with them." –Dr. Albert-Laszlo Barabasi
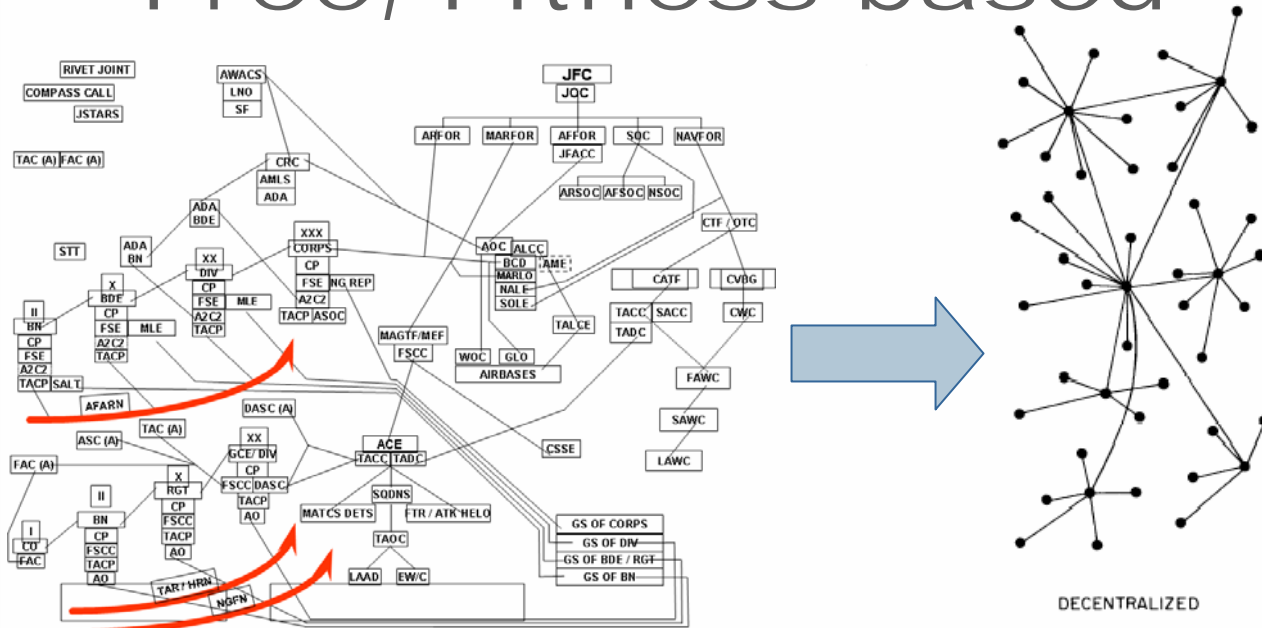
Genesis of Network Theory
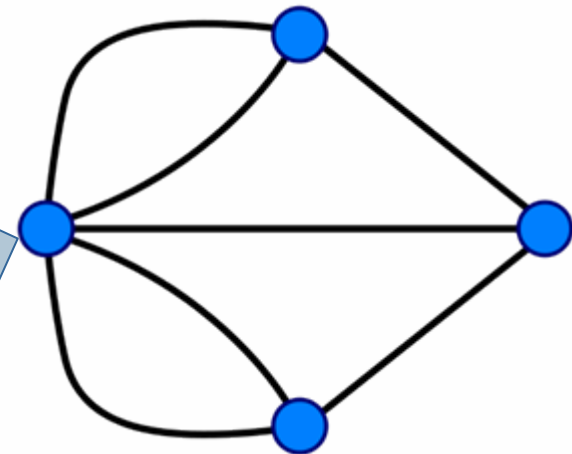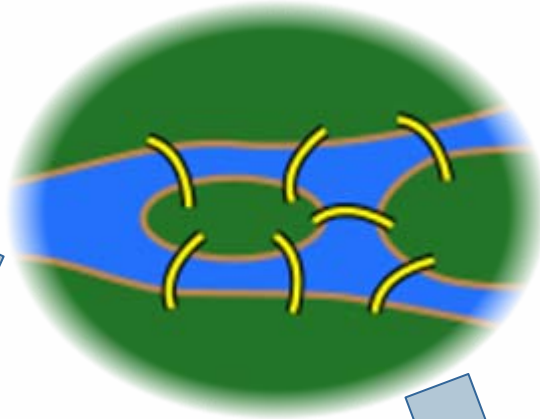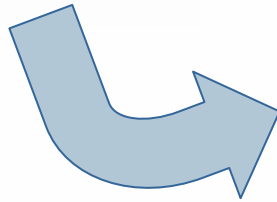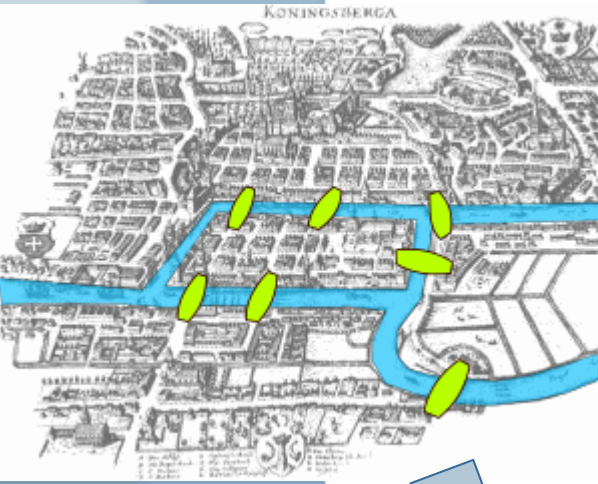
All these networks have similar topologies, regardless of the character
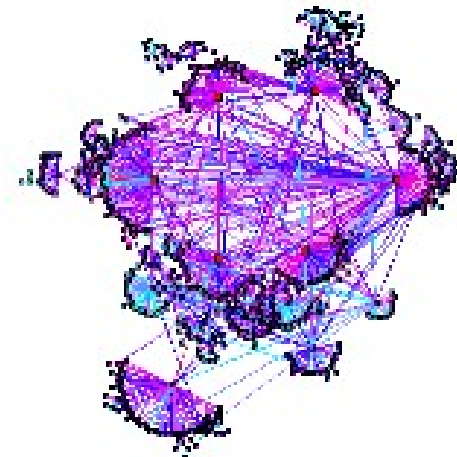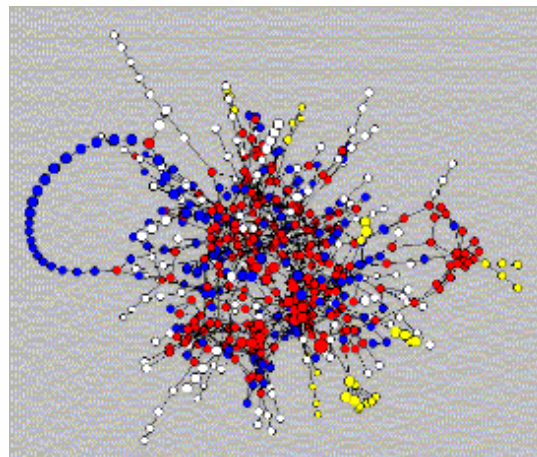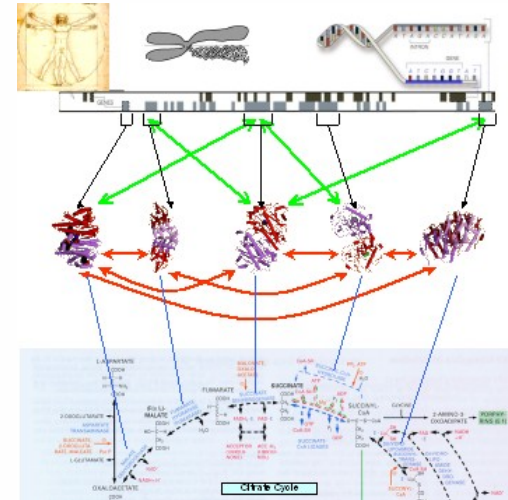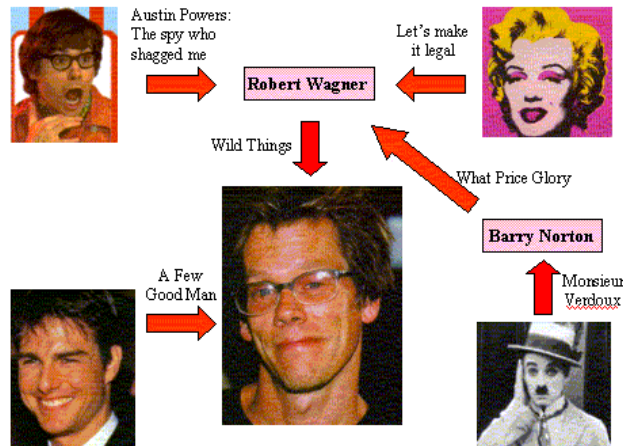
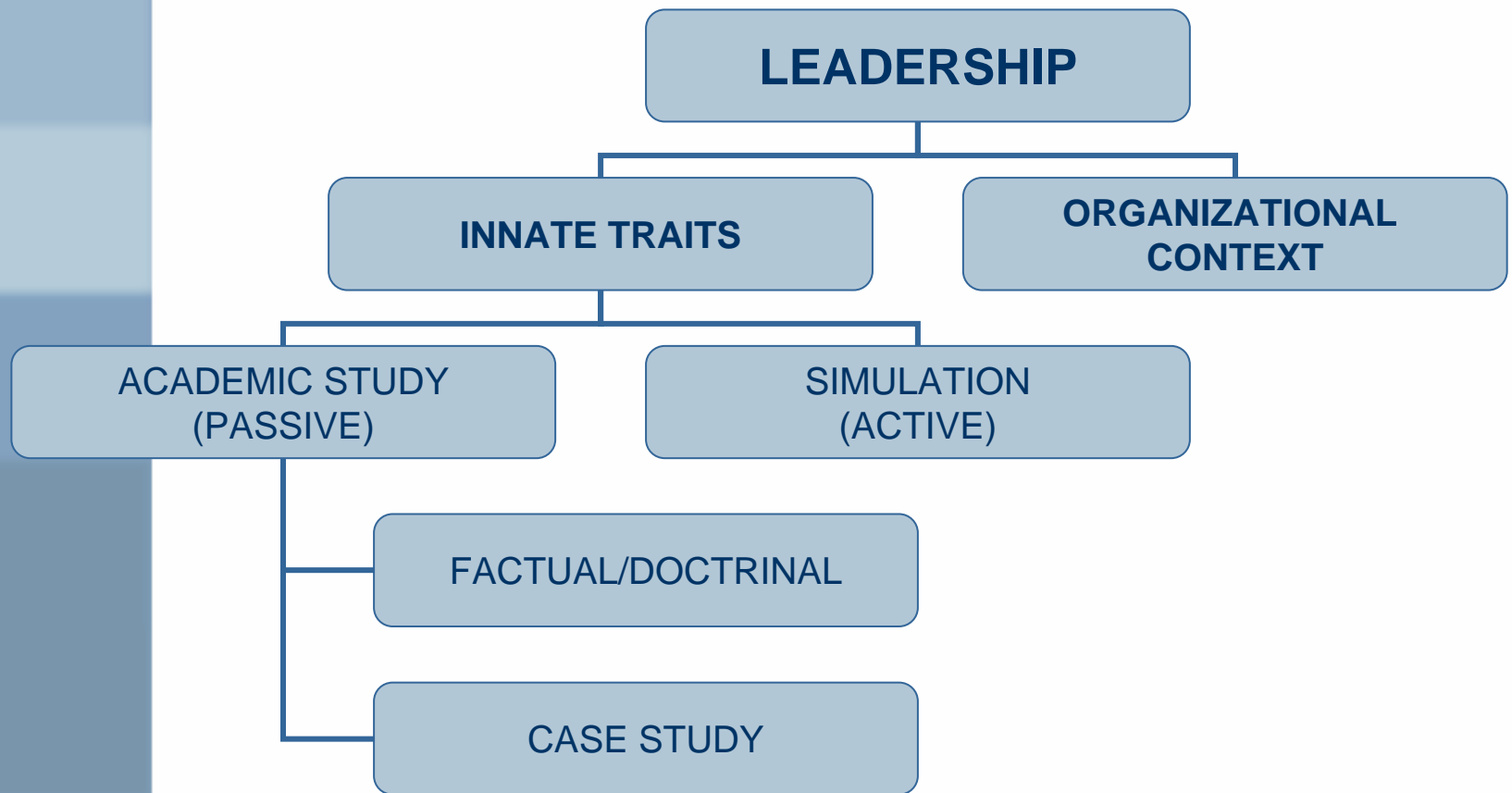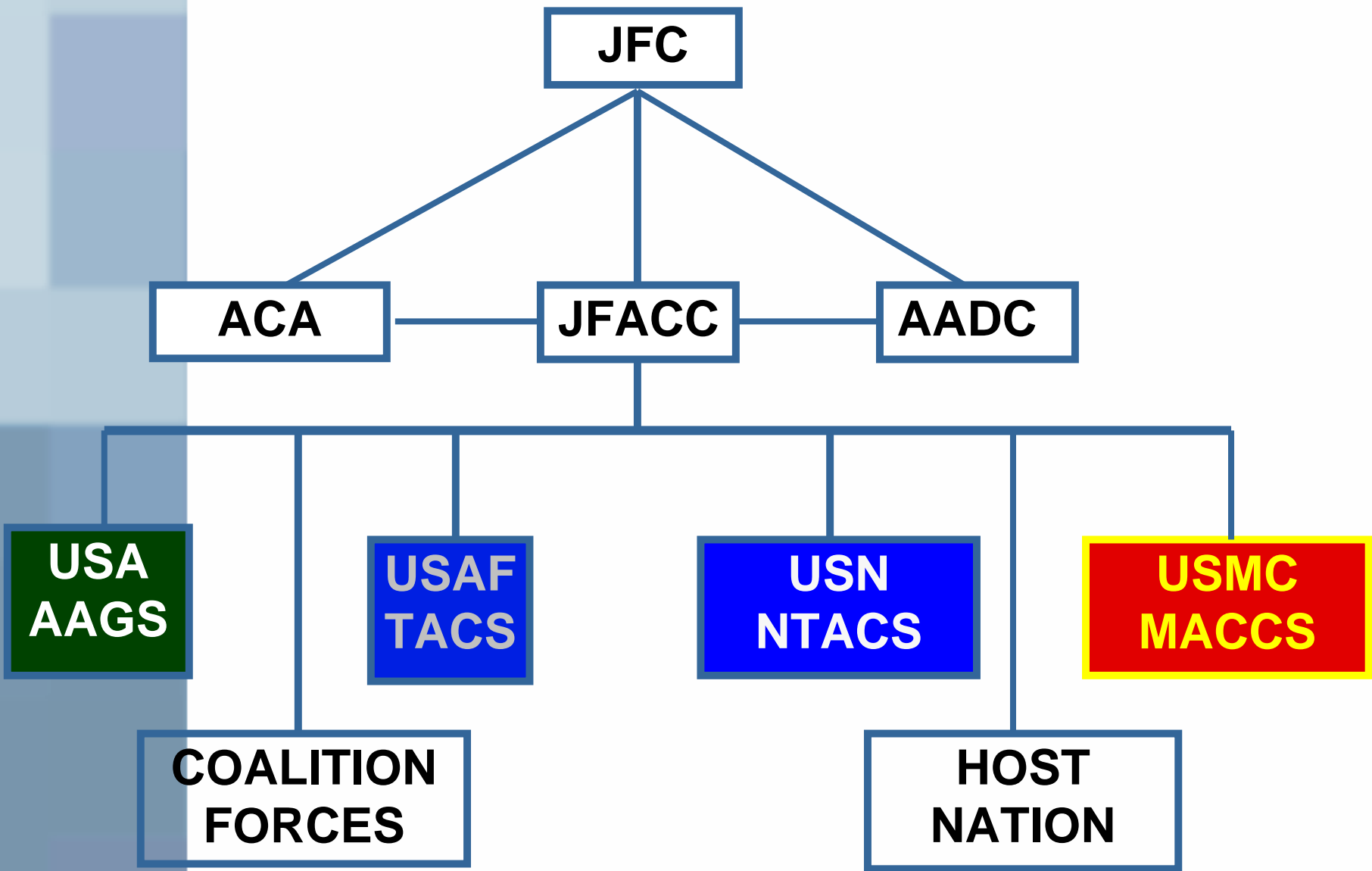# C2 Networks are Scale-Free, Fitness-based

DECENTRALIZED

- C2 have hubs--defining trait
- Are actually fractals
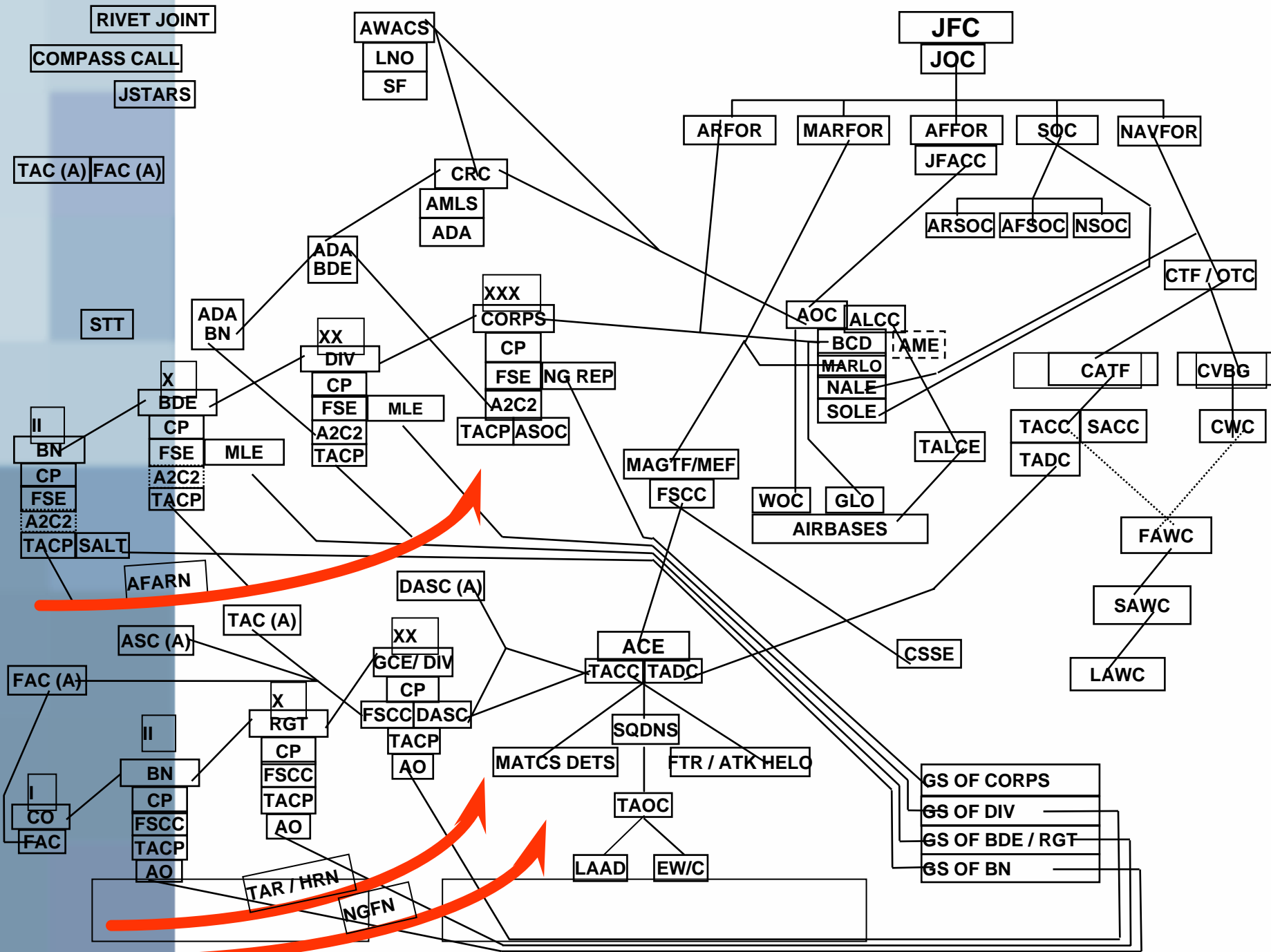- Properties of a human network

Leadership as a Network Property

"This is not to say that individual qualities are not important, but rather that sustainable and replicable qualities of leadership are treated here as a network property, made possible by the combination of the social network and the individuals themselves."- Dr. John H. Clippinger

How do we train Network Leaders?

RIVET JOINT

COMPASS CALL

JSTARS

TAC (A) FAC (A)

STT

AWACS
LNO
SF

JFC
JOC

ARFOR MARFOR AFFOR SOC NAVFOR
JFACC

ARSOC AFSOC NSOC

CRC
AMLS
ADA

ADA
BDE

ADA
BN

XXX
CORPS
CP
FSE NG REP
A2C2
TACP ASOC

XX
DIV
CP
FSE MLE
A2C2
TACP

CTF / OTC

AOC ALCC
BCD AME
MARLO
NALE
SOLE

CATF CVBG

TACC SACC
TADC CWC

X
BDE
CP
FSE MLE
A2C2
TACP

II
BN
CP
FSE
A2C2
TACP SALT

AFARN

MAGTF/MEF
FSCC

TALCE

WOC GLO
AIRBASES

FAWC

SAWC

LAWC

DASC (A)

TAC (A)

ASC (A)

FAC (A)

XX
GCE/ DIV
CP
FSCC DASC
TACP
AO

ACE
TACC TADC

SQDNS

MATCS DETS FTR / ATK HELO

CSSE

II
BN
CP
FSCC
TACP
AO

X
RGT
CP
FSCC
TACP
AO

I
CO
FAC

TAOC

LAAD EW/C

TAR / HRN

NGFN

GS OF CORPS
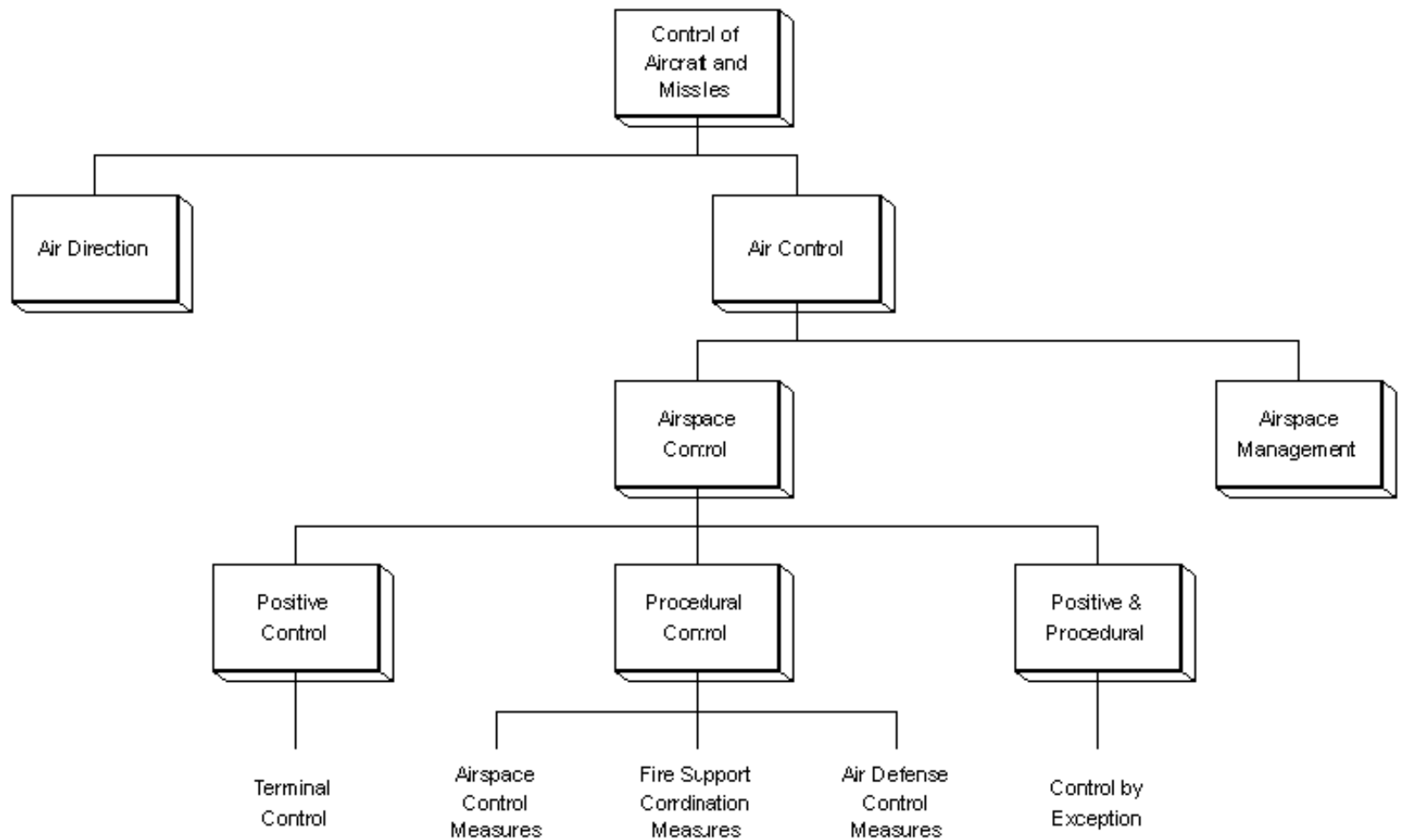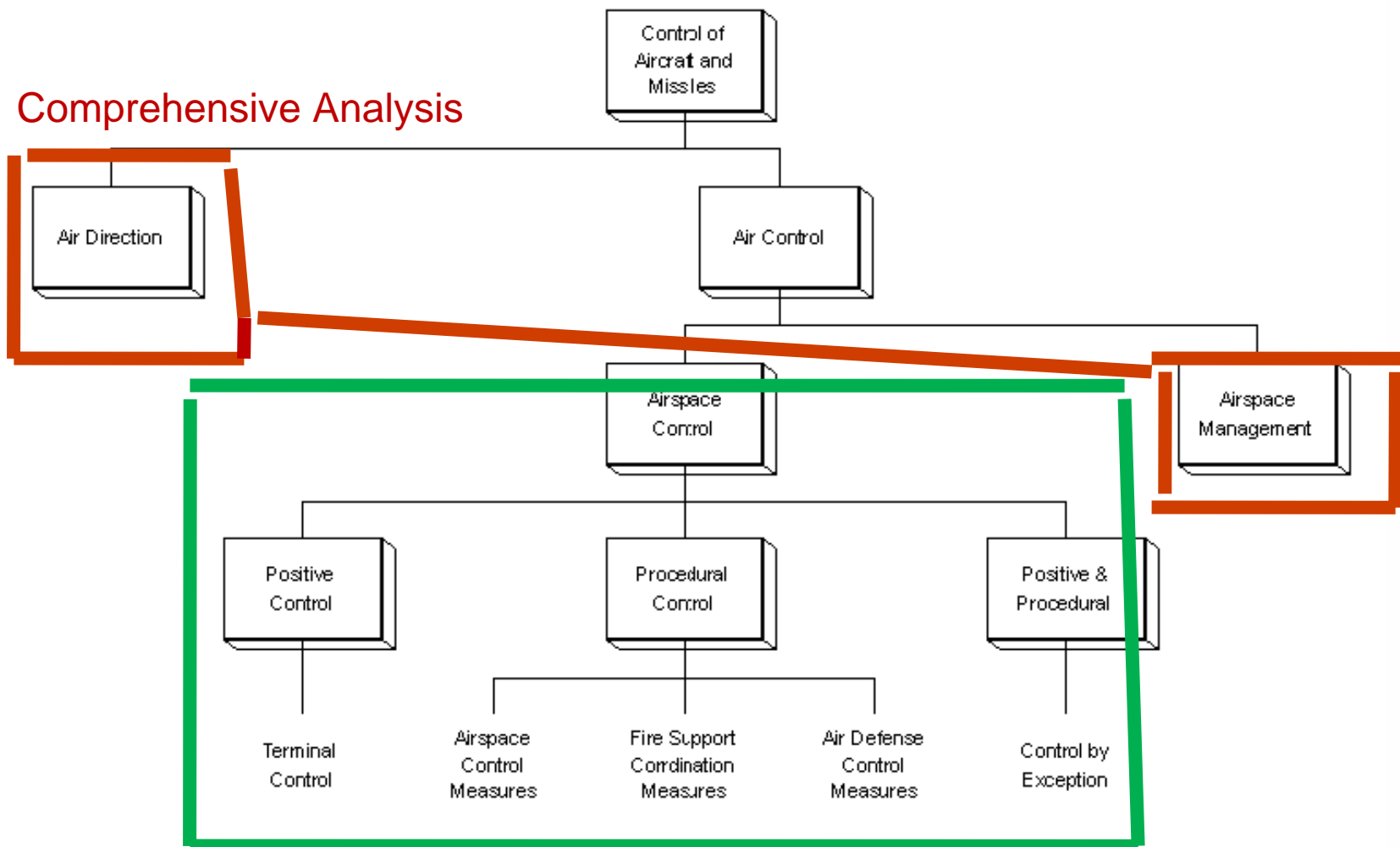GS OF DIV
GS OF BDE / RGT
GS OF BN

Practical Example

- MACCS -Marine Aviation Command and Control System
- TACC -Tactical Air Command Center (Senior Agency)
- DASC -Direct Air Support Center
- TAOC -Tactical Air Operations Center
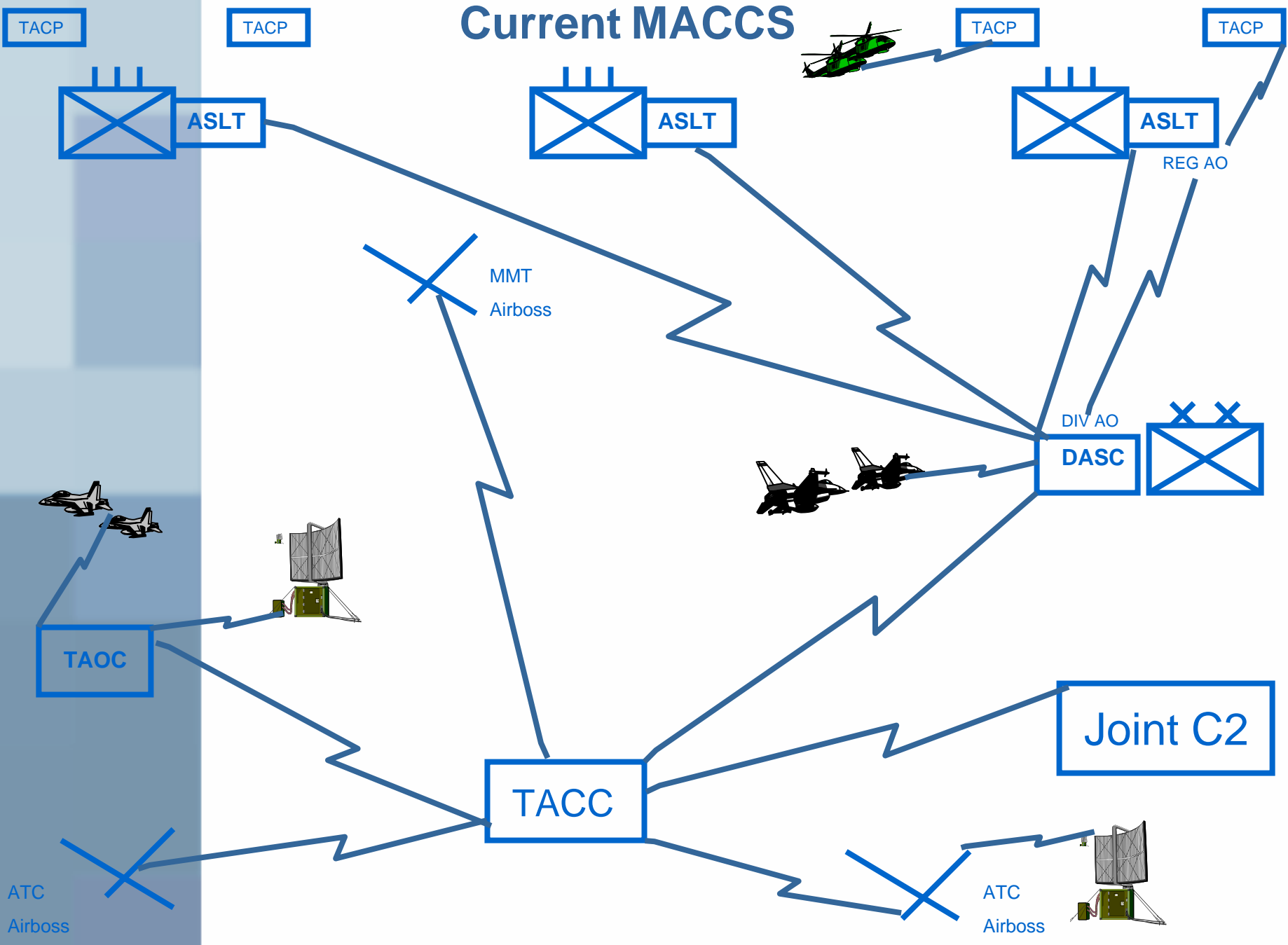- FSCC -Fire Support Coordination Center

Current MACCS

TACP
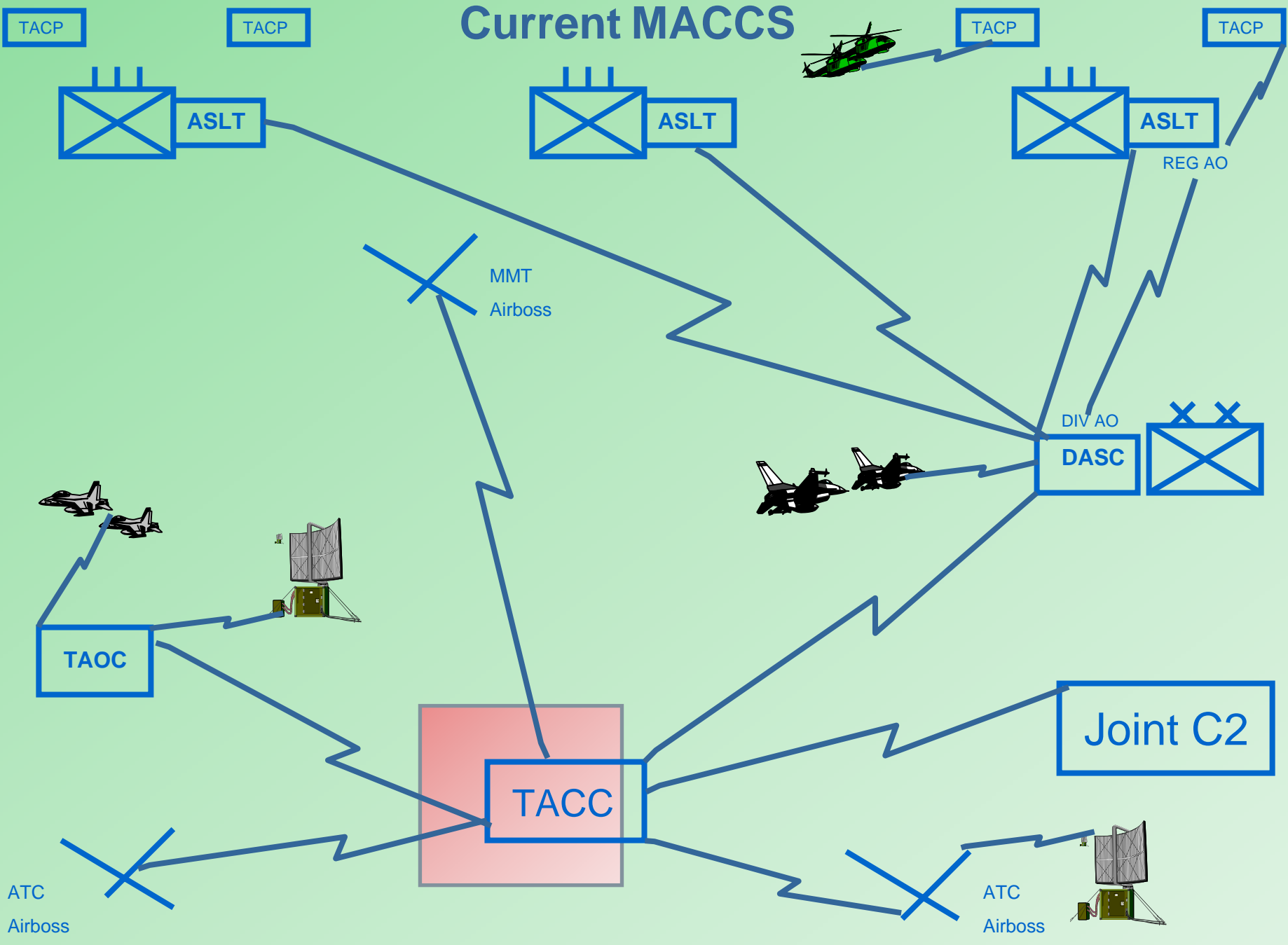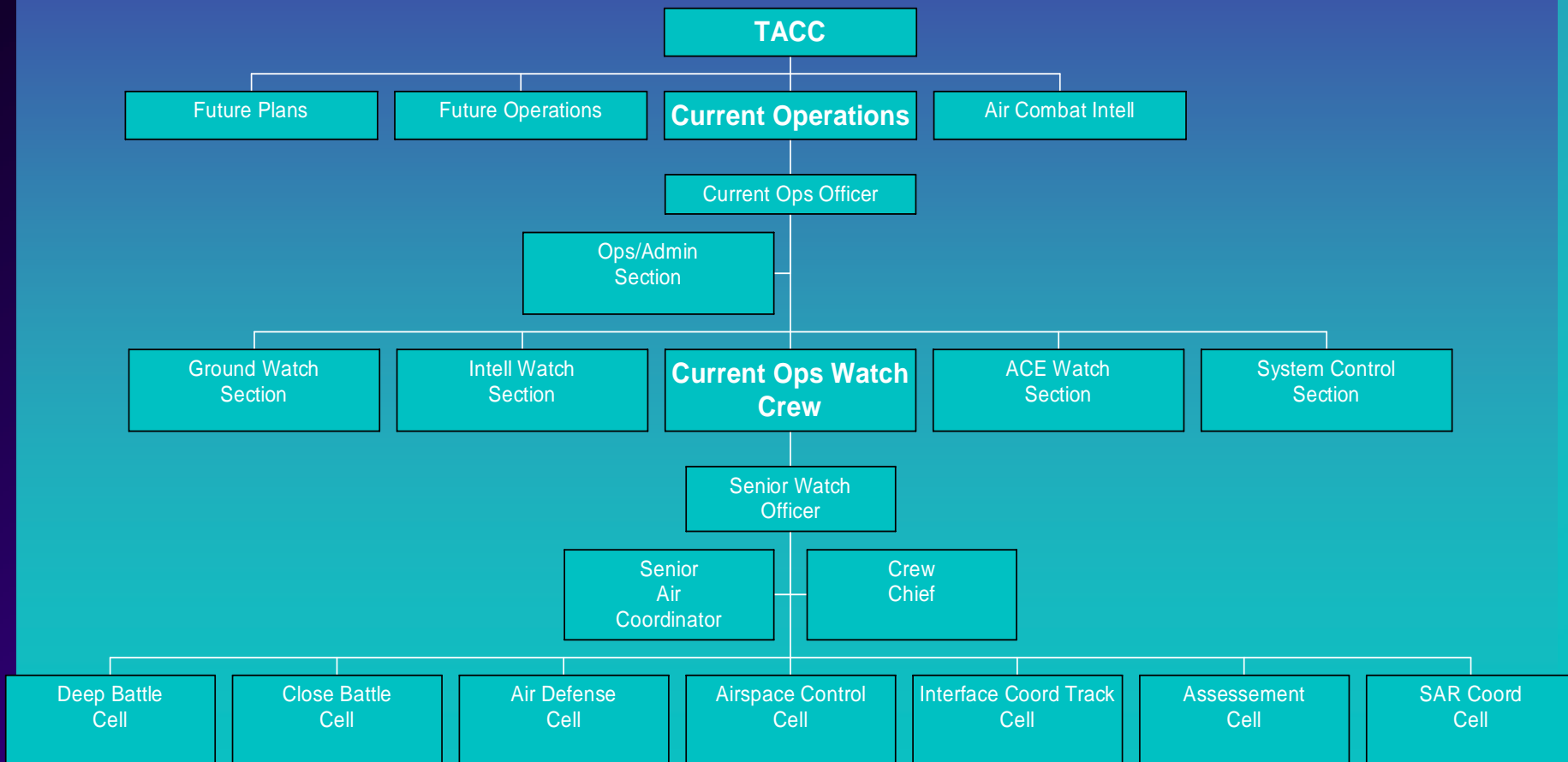
TACP

TACP

TACP

ASLT

ASLT

ASLT

REG AO

MMT
Airboss

DIV AO

DASC

TAOC

Joint C2

TACC

ATC
Airboss

ATC
Airboss

Current MACCS

TACP

TACP

TACP

TACP

ASLT

ASLT

ASLT

REG AO

MMT

Airboss

DIV AO

DASC

TAOC

Joint C2

TACC

ATC

Airboss

ATC

Airboss

TACC ORGANIZATION

Conclusion

- It is a profoundly erroneous truism, repeated by all copybooks and by eminent people when they are making speeches, that we should cultivate the habit of thinking about what we are doing. The precise opposite is the case. Civilization advances by extending the numbers of important operations which we can perform without thinking about them. Operations of thought are like cavalry charges in battle--they are strictly limited in number, they require fresh horses, and must only be made at decisive moments.

- *- Alfred North Whitehead*

- When making a decision of minor importance, I have always found it advantageous to consider all the pros and cons. In vital matters, however, such as the choice of a mate or a profession, the decision should come from the unconscious, from somewhere within ourselves. In the important decisions of personal life, we should be governed, I think, by the deep inner needs of our nature."

- *- Sigmund Freud*