



8th ICCRTS



Preparing Junior Officers for Roles in FORCEnet & Network Centric Operations

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FORCEnet's Network Centric Warriors



FORCEnet

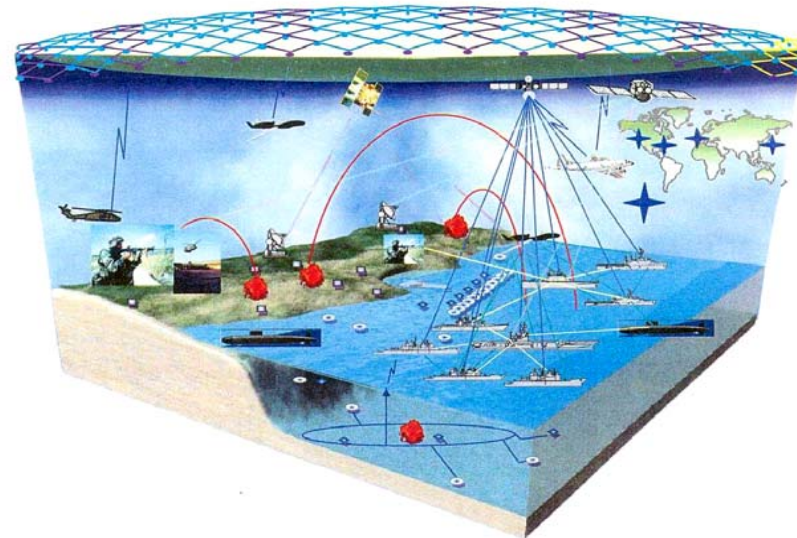
Network Centric Warfare is the theory.

Network Centric Operations is the concept.

FORCEnet is the process of making the theory and concept a reality.

FORCEnet is the integration of sensors, networks, weapons, platforms, information and people to provide agile, lethal, efficient combat power.

Seamless Information



“Sea Strike, Sea Shield, and Sea Basing will be enabled by ForceNet, an overarching effort to integrate warriors, sensors, networks, command and control, platforms, and weapons into a fully netted, combat force. We have been talking about network-centric warfare for a decade, and ForceNet will be the Navy's plan to make it an operational reality.” –CNO, Oct 02

FORCEnet IS THE SYSTEMATIC ACCELERATION OF NCW TO REALITY

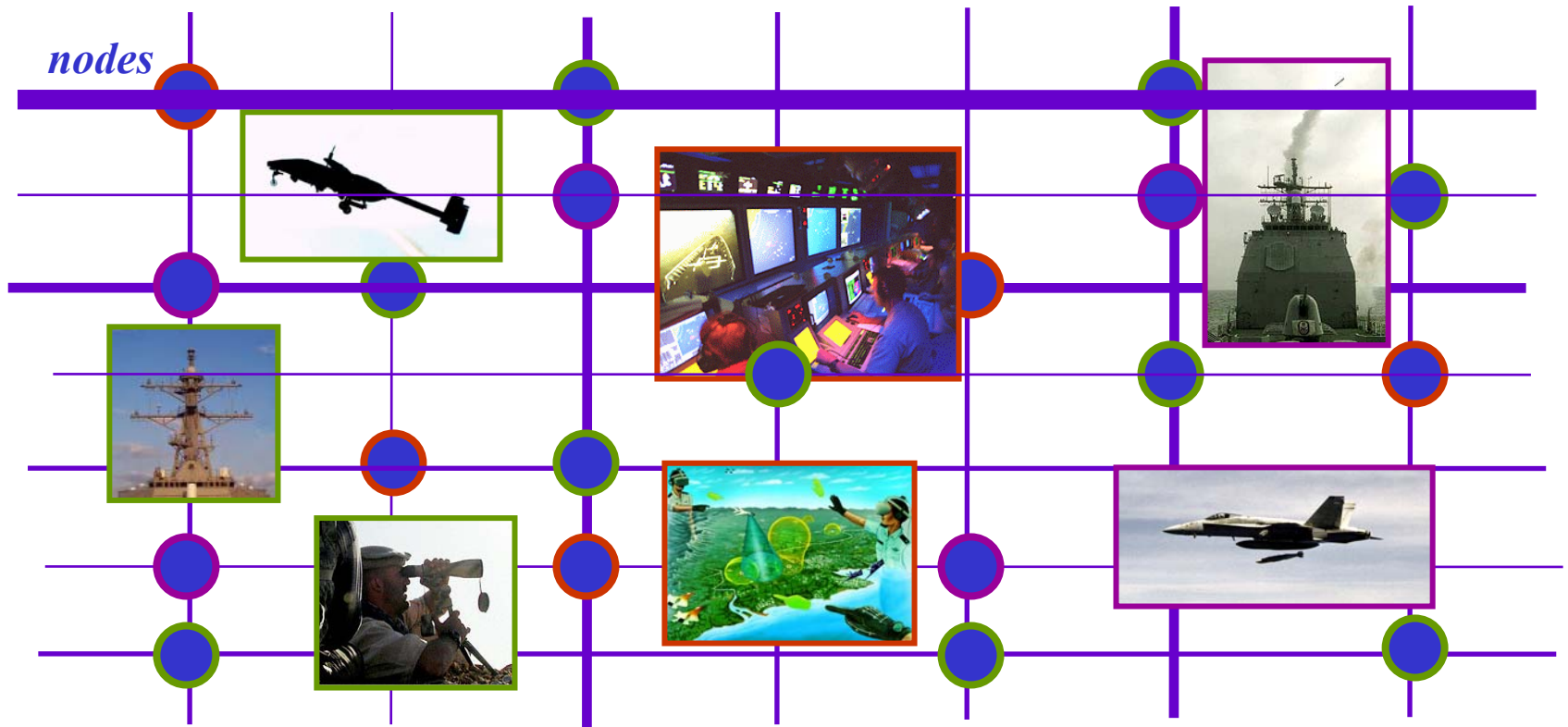
A FULLY NETTED FORCE + 21ST CENTURY WARRIOR = FORCENET

The Network Centric Approach

Sensing

C²

Weapons



- Functions Distributed across the Network
- Sensors, Weapons, Operators, Commanders
- Distributed Intelligence and Knowledge
- *New Organizations and New Rules*

- Vastly Improved Individual Awareness
- Greatly Expanded Shared Awareness
- Extensive Collaboration
- *New Competencies and Culture*

Goals of the Network Centric Approach are *Superior Organizational Qualities*

New Forms, Roles & Behaviors:

- Near-Universal Access
(independent of location)
- Shared, Improved Situational Awareness
(rich, customized information domains)
- Cross-Functional Collaboration
(Ops, Plans, Intel, Log, Metoc, JAG, etc.)
- Close Coordination & Shared Learning
(among nodes / task elements)

Quality of Performance in Key Operating Abilities:

- *Speed*
- *Precision*
- *Appropriate Effects*
- *Adaptability*
- *Agility*
- *Battlefield Innovation*
- *Initiative*
- *Unity of Effort*



Pursuing the Human Element of NCW



NCW Organizational
Performance Qualities



Pursuing the Human Element of NCW



New Organizational
People, Processes,
Structures, Culture

NCW Organizational
Performance Qualities



Pursuing the Human Element of NCW



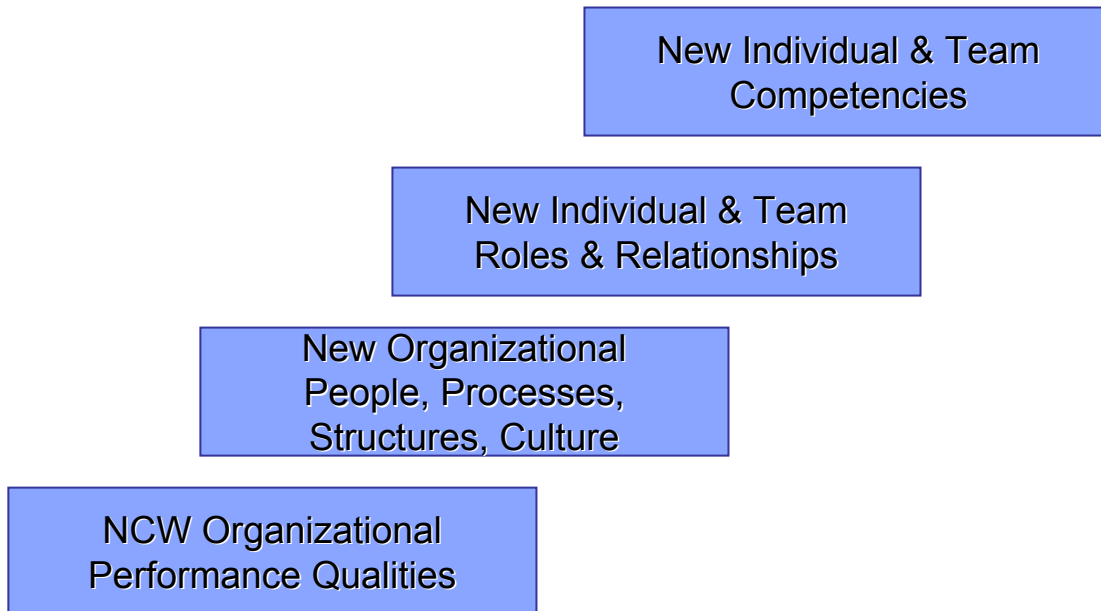
New Individual & Team
Roles & Relationships

New Organizational
People, Processes,
Structures, Culture

NCW Organizational
Performance Qualities

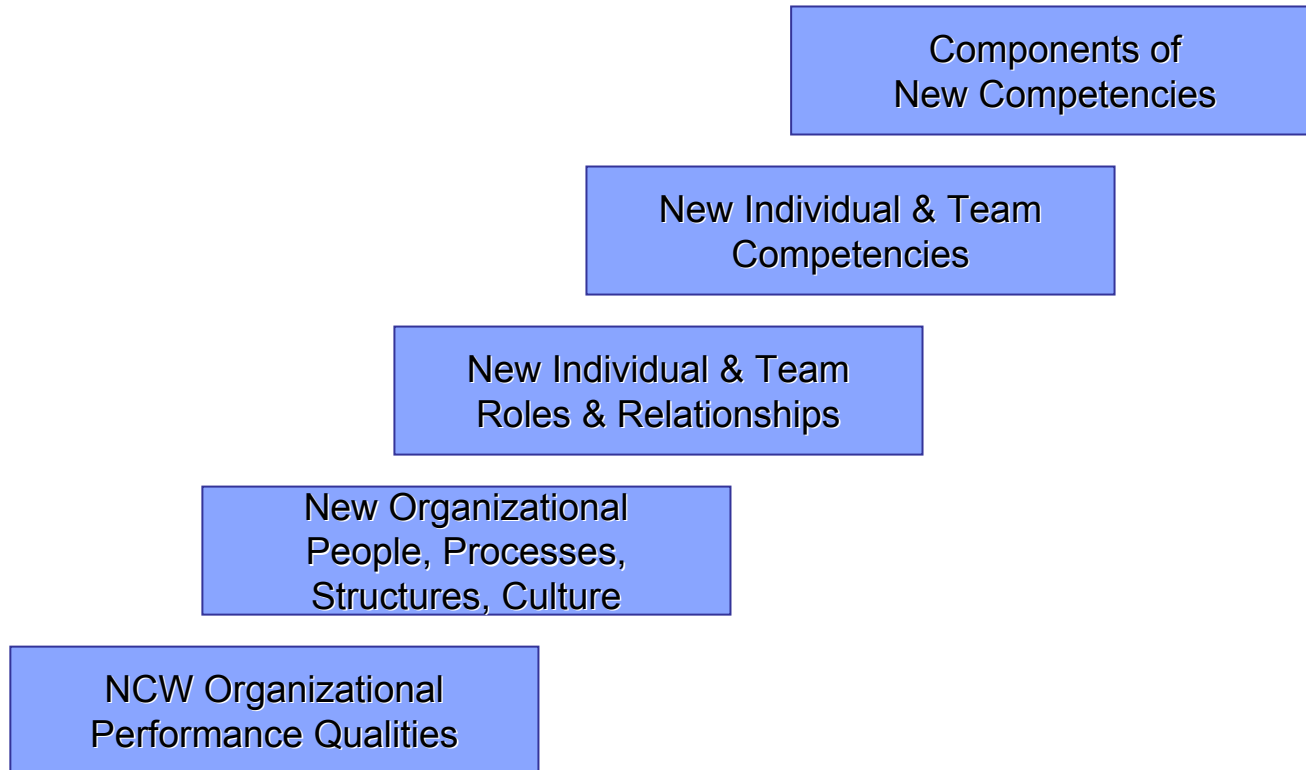


Pursuing the Human Element of NCW



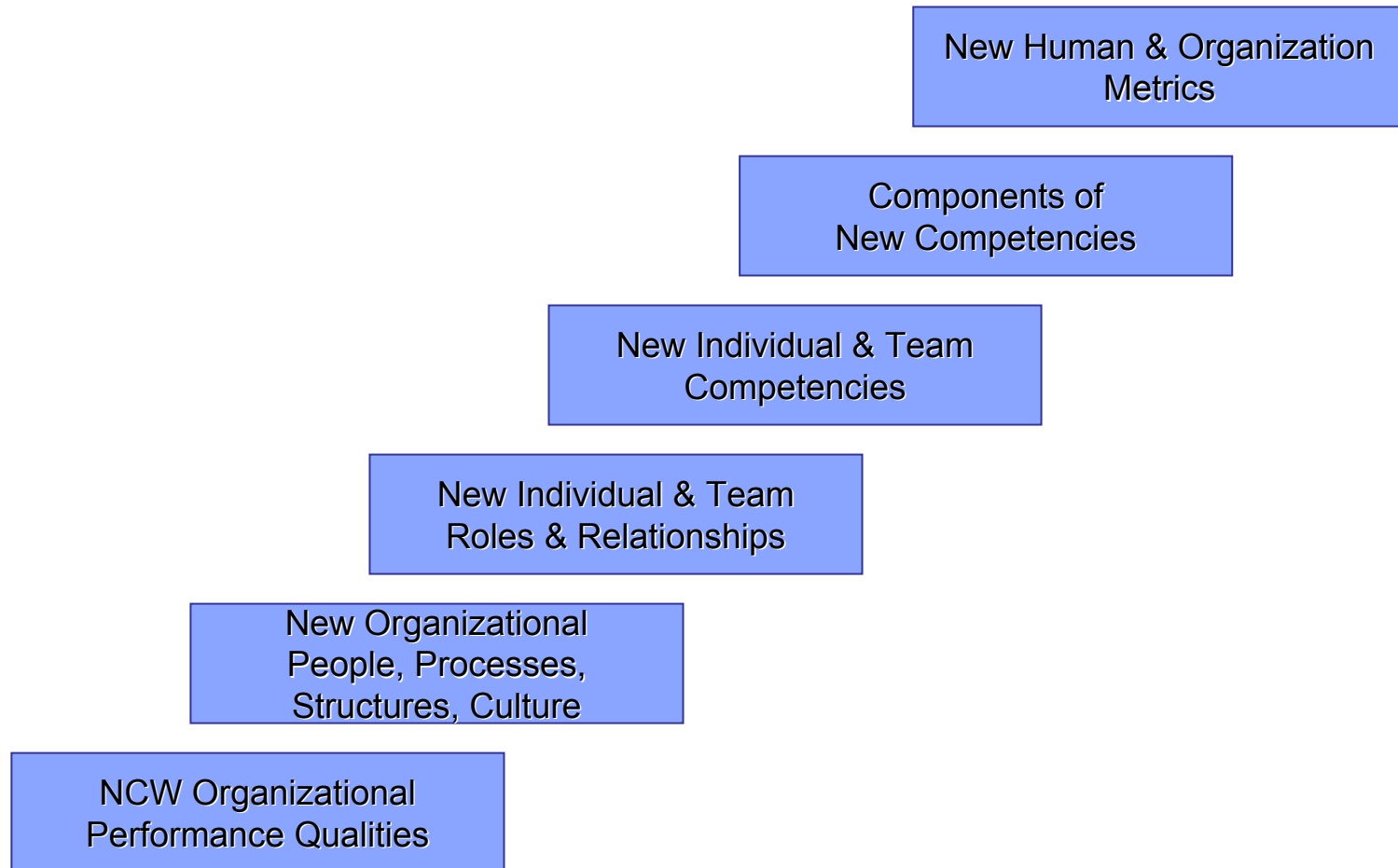


Pursuing the Human Element of NCW



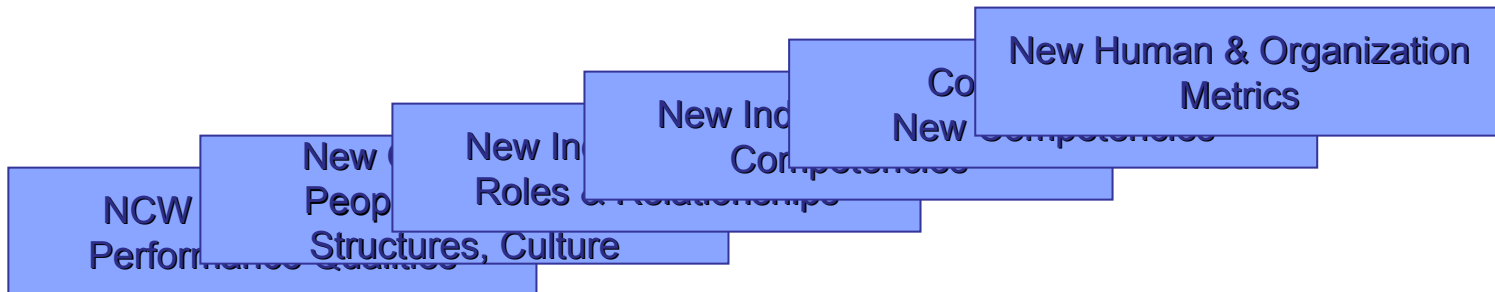


Pursuing the Human Element of NCW



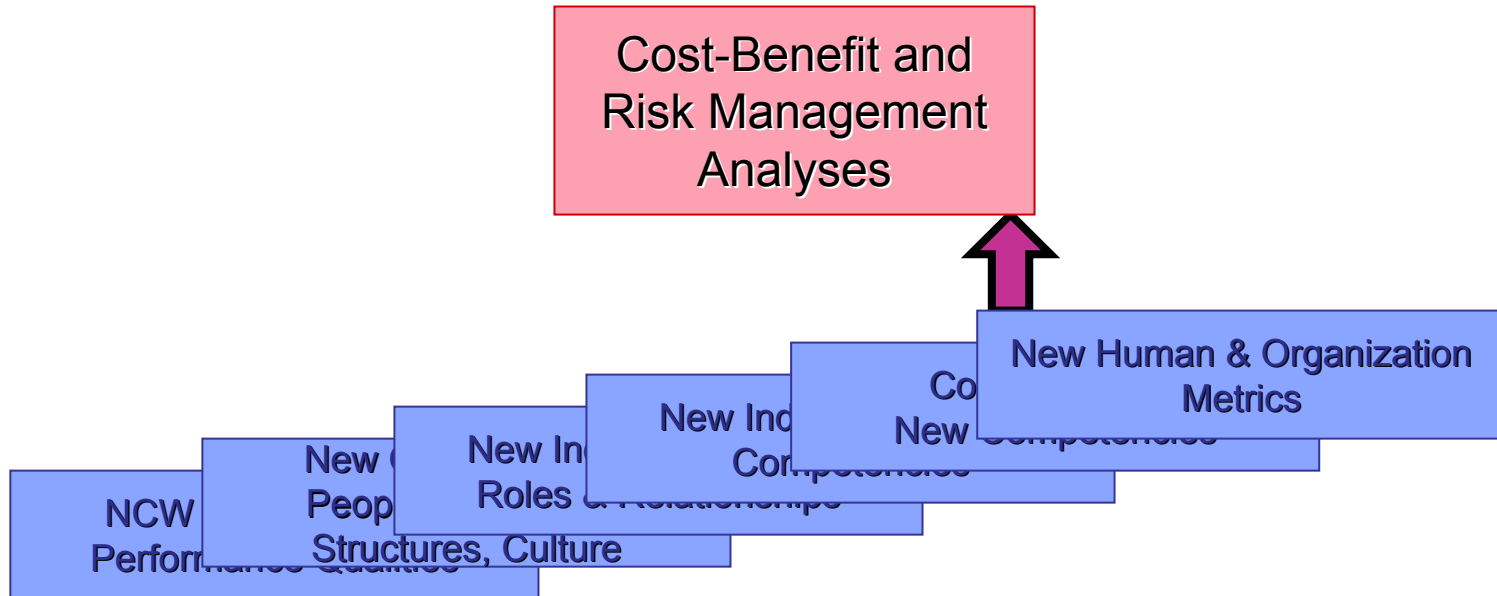


Pursuing the Human Element of NCW



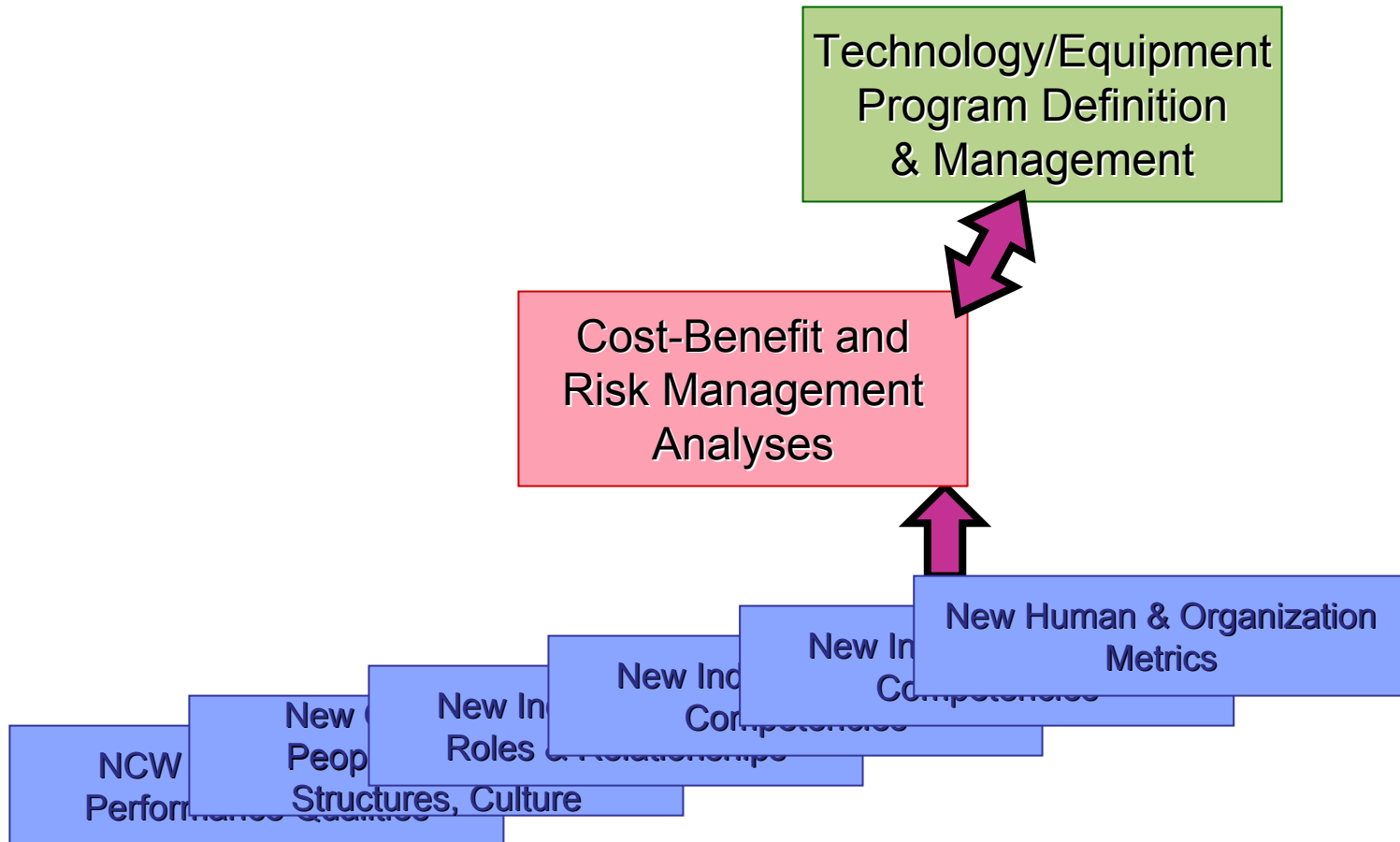


Pursuing the Human Element of NCW



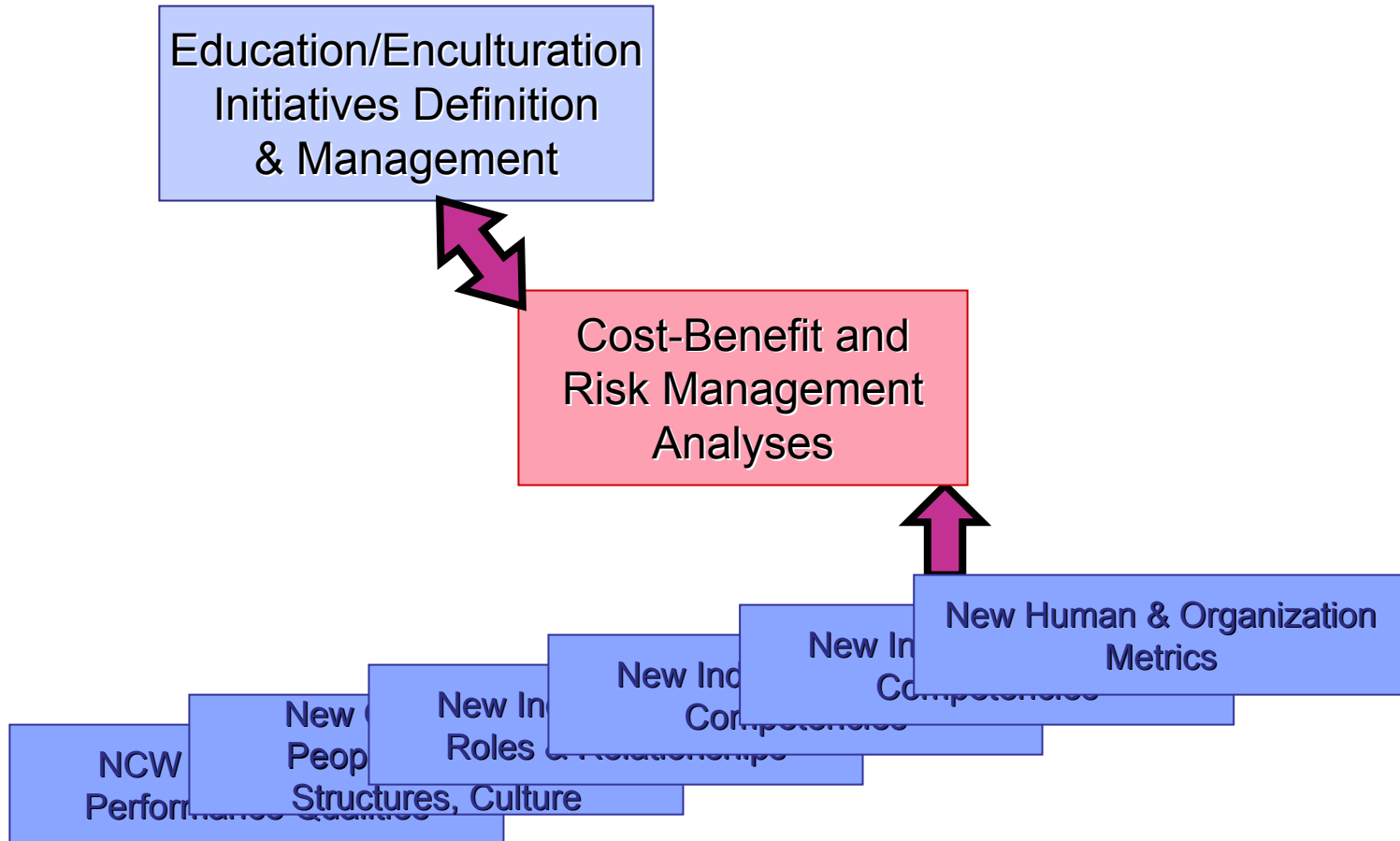


Pursuing the Human Element of NCW



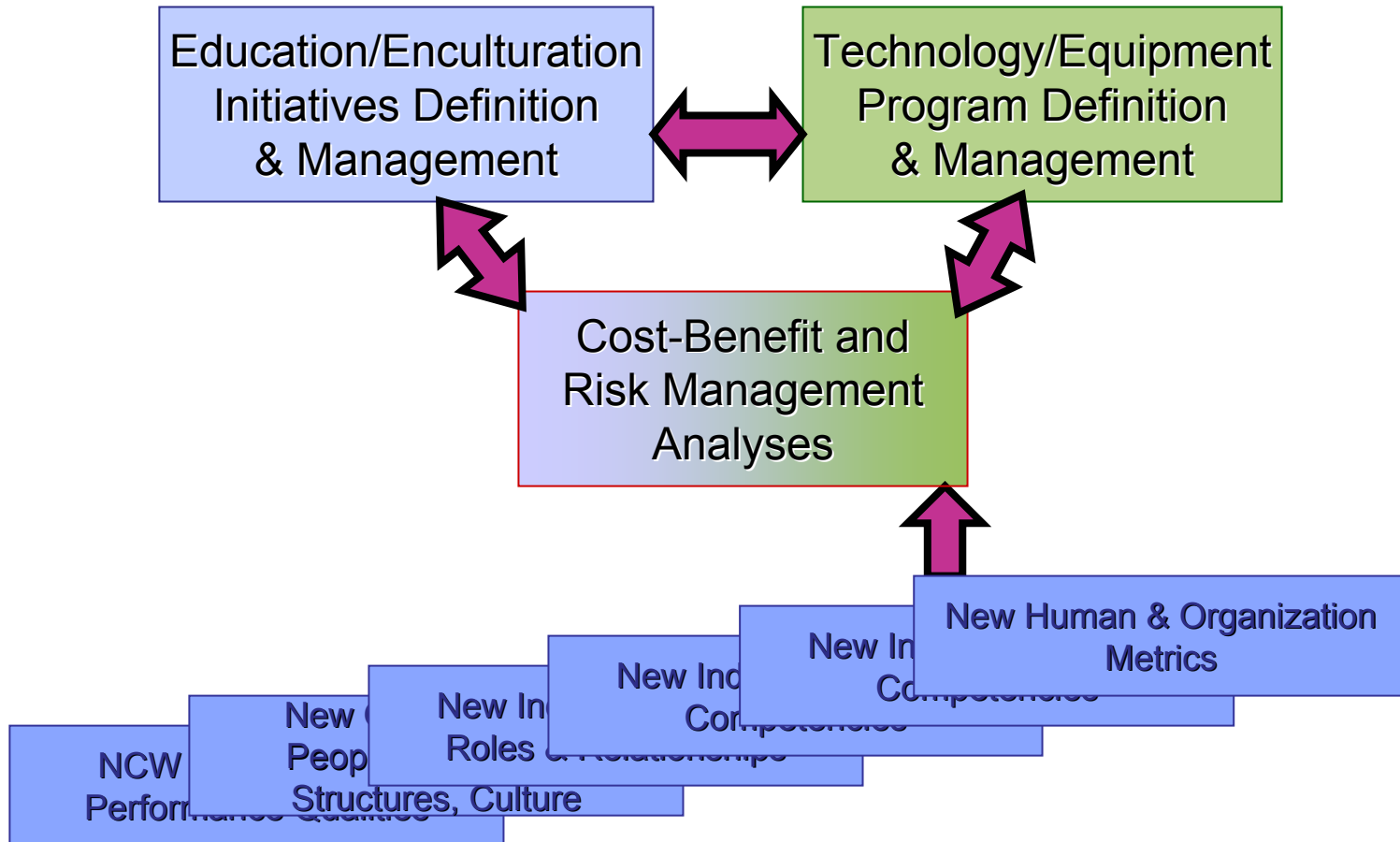


Pursuing the Human Element of NCW



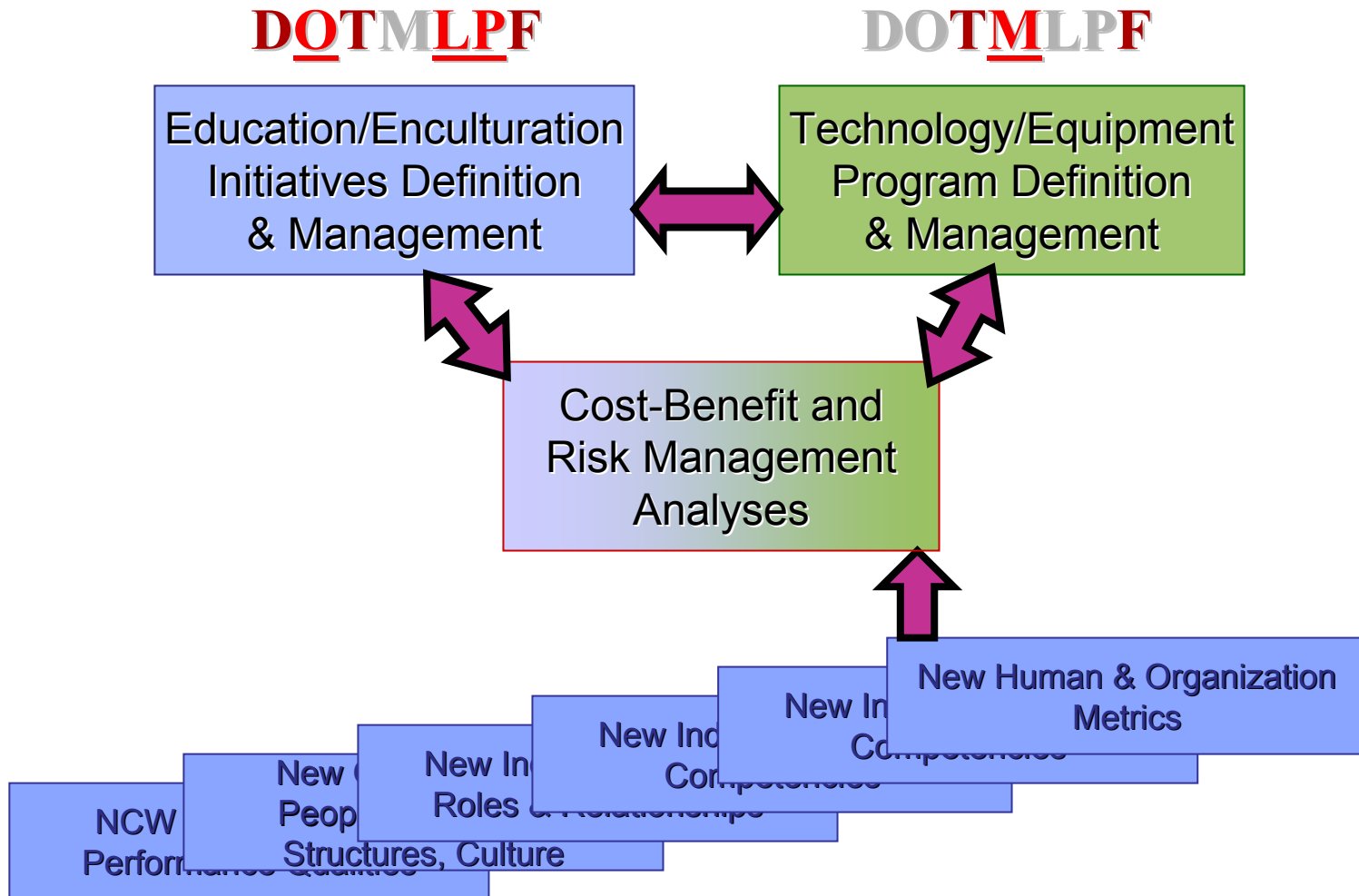


Pursuing the Human Element of NCW





Pursuing the Human Element of NCW



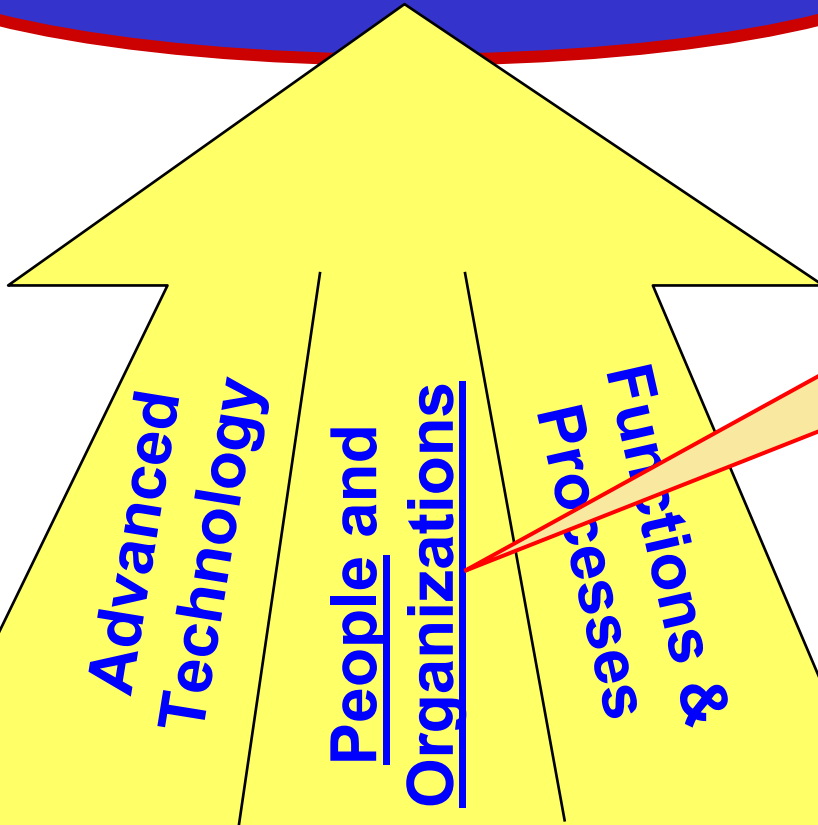


“Co-Evolution”

Not Just Technology



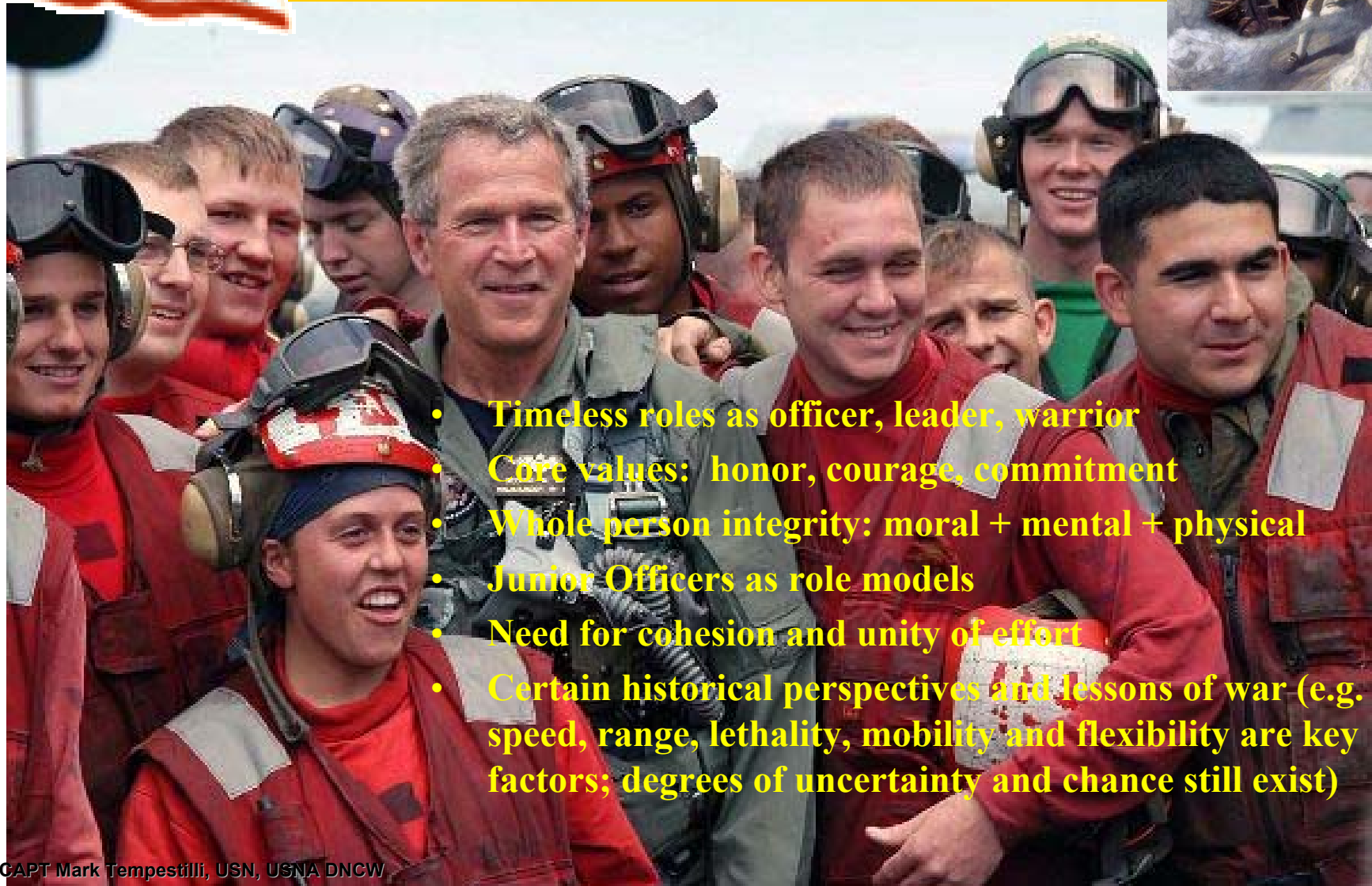
Network-Centric Warfare



Equally Critical to Success



What *Doesn't* Change...



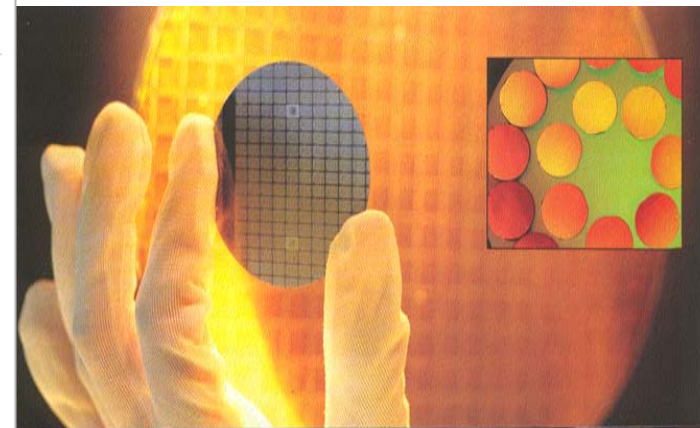
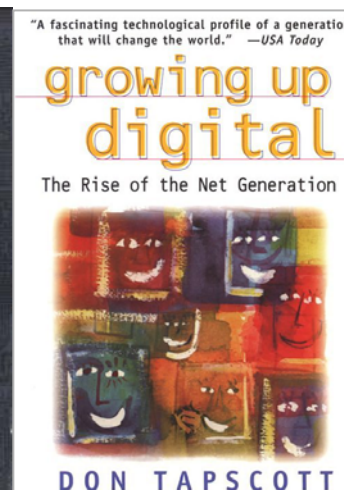
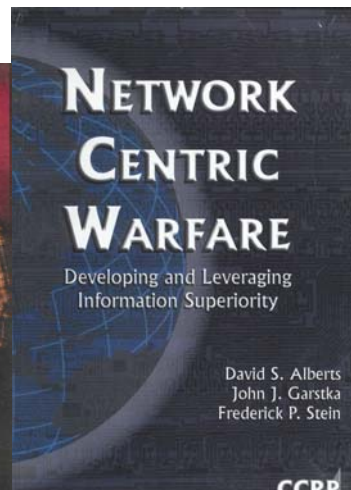
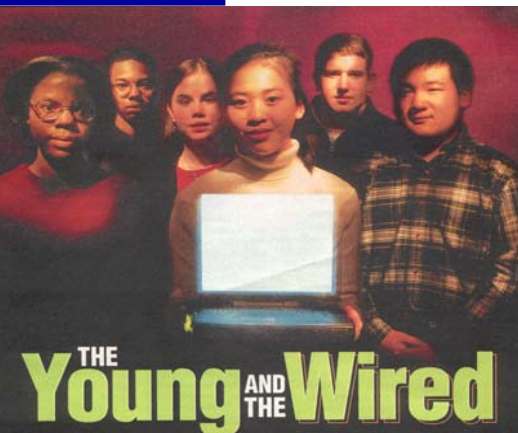
- Timeless roles as officer, leader, warrior
- Core values: honor, courage, commitment
- Whole person integrity: moral + mental + physical
- Junior Officers as role models
- Need for cohesion and unity of effort
- Certain historical perspectives and lessons of war (e.g. speed, range, lethality, mobility and flexibility are key factors; degrees of uncertainty and chance still exist)



What *Does* Change...



- New and rapidly advancing technologies, especially IT
- Much greater information reach, volume, & complexity
- New strategic and operational contexts
- New real-world lessons of NCW (both successes & pitfalls)
- *A new generation of undergraduates & Midshipmen*
- *Need for greatly increased innovation & agility*





What *Does* Change...

continued



accenture

Chinese to
Become #1
Web
Language
by 2007

Innovation and the Modern Military

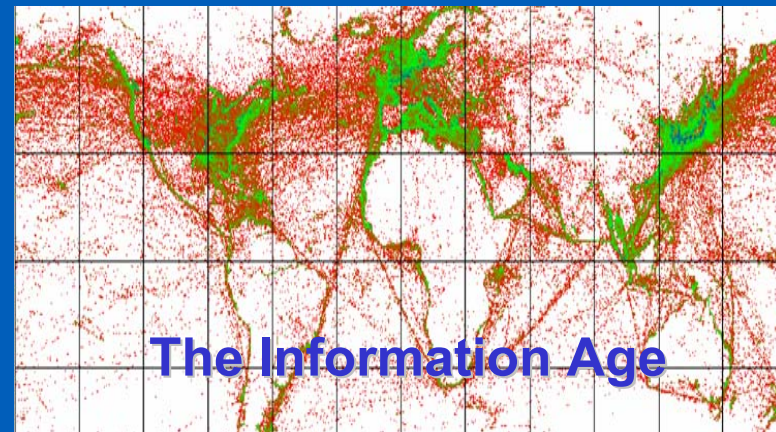
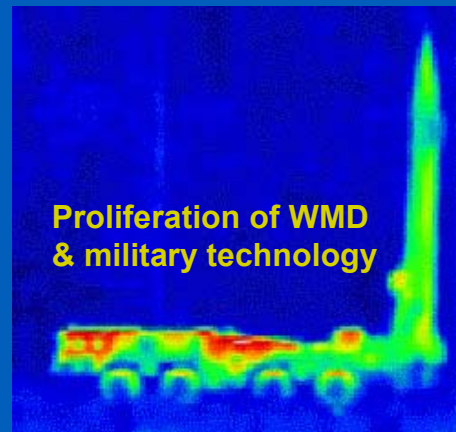
WINNING
THE NEXT
WAR



STEPHEN PETER ROSEN

- Increased battle complexity & enemy diversity
- New operational and tactical mission variety
- Even faster and more adaptive ops
- New organizations, doctrine and TTP
- Effects-oriented approach
- *New behavioral rules & principles*
- *Leadership & warfighting in new context*

{Now it gets
interesting.}





The Familiar Process

Surveillance and Reconnaissance

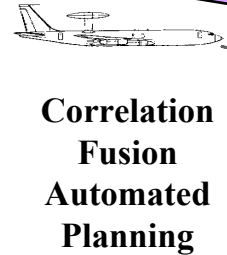
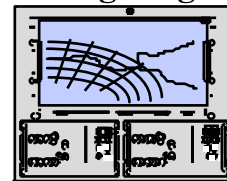
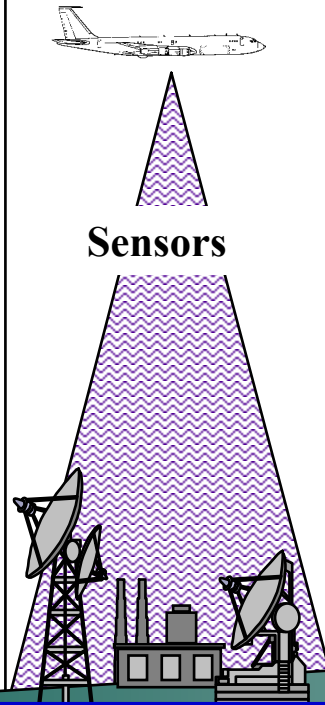
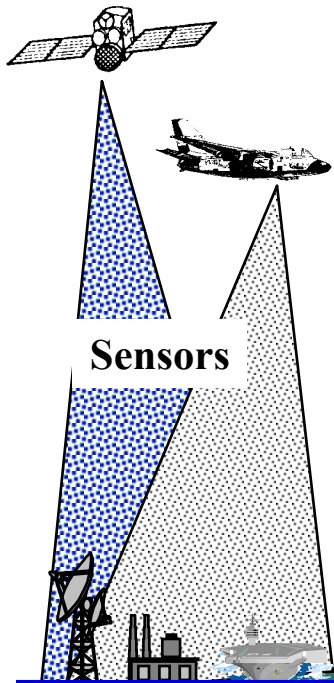
Acquisition and Localization

Targeting

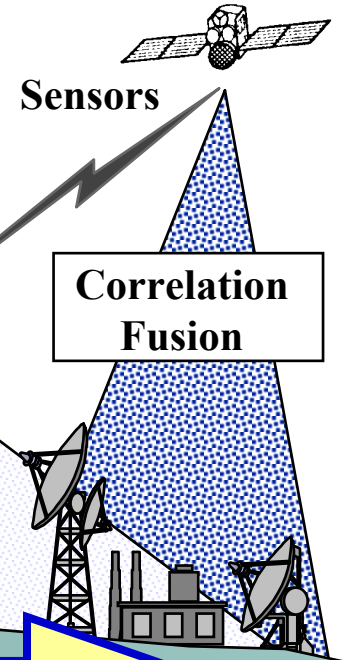
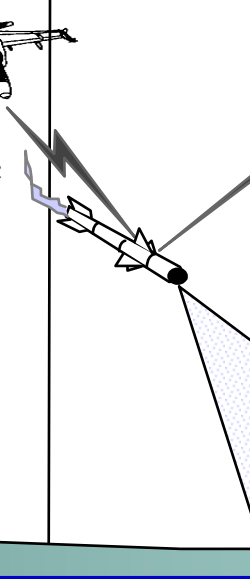
Weapons Engagement, Launch and Guidance

Weapons Homing

Battle Damage Assessment (BDA)



Dynamic Decision Aids



Observe

-

Orient

-

Decide

-

Act

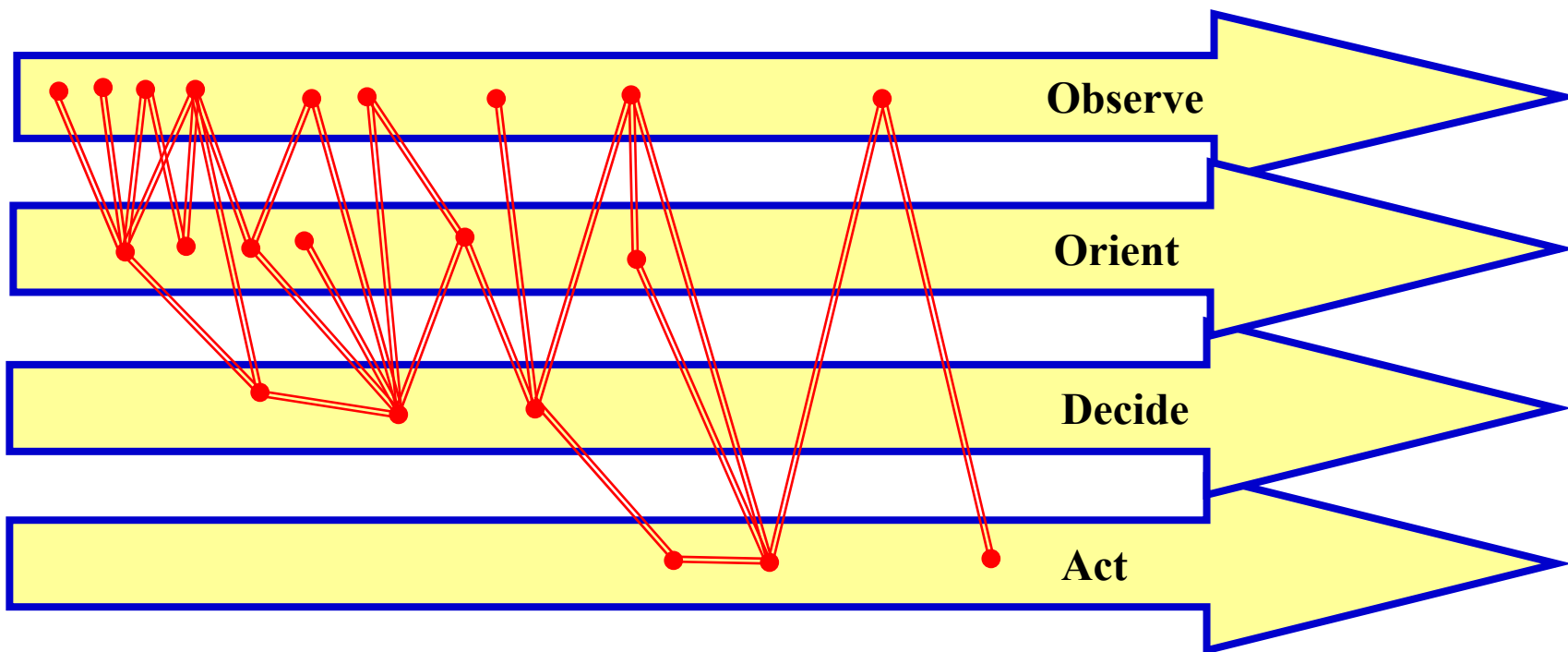
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Observe Again

Sequential, linear, cyclic activity



The Emerging Network-based Process



Parallel, collective, non-linear activity



Public Example: *Self-Organizing, Collaborative Communities On Line*



In Princeton, N.J., scientists at the NEC Research Institute recently published a paper concluding that the Web's seemingly disorganized structure actually "self-organizes into communities of related information" that computers can identify through link patterns. The patterns lend themselves to certain algorithms, the researchers wrote, which could search more effectively in specialized areas such as science or medicine. As an example, the Rutgers team published a collection of pages it found relating to the Sept. 11 terrorist attacks, which is online at www.webselforganization.com/example.html.

- Leslie Walker, "Search Engines Home In,"
Washington Post, 4 April 2002

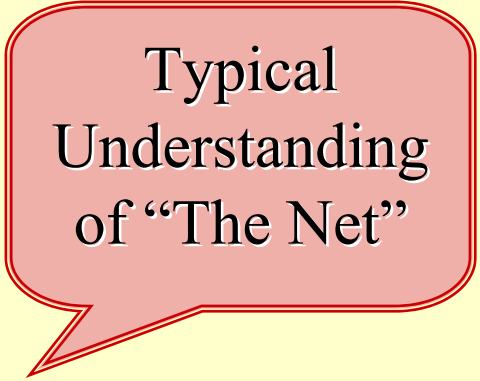


**Need to
EDUCATE & ENCULTURATE
for Network Centric Warfare**

↑ Communities of Web Site visitors

Notional Model of Network Centric Ops

POC: CAPT Mark Tempestilli, USN, USNA DNCW



Typical
Understanding
of “The Net”

Information Infrastructure Performance
Advanced communications & computing & content

Notional Model of Network Centric Ops

POC: CAPT Mark Tempestilli, USN, USNA DNCW

C² = Command & Control
OR
Command & Coordination

**“Network Centric”
Organizational
Behavior**



**“Knowledge Superiority”
Status**

Shared understanding of situations and intents

Information Infrastructure Performance

Advanced communications & computing & content

Notional Model of Network Centric Ops

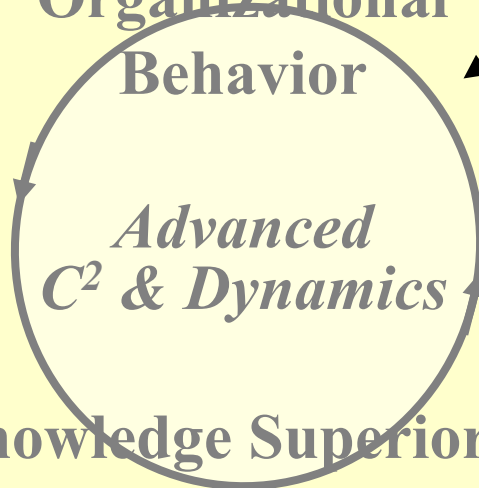
POC: CAPT Mark Tempestilli, USN, USNA DNCW

Effects-Based Outcomes

Best strategic, operational, tactical effects

EBO details: 

“Network Centric”
Organizational
Behavior



*Advanced
C² & Dynamics*

“Knowledge Superiority”
Status

Shared understanding of situations and intents

Information Infrastructure Performance

Advanced communications & computing & content

Notional Model of Network Centric Ops

POC: CAPT Mark Tempestilli, USN, USNA DNCW

Effects-Based Outcomes

Best strategic, operational, tactical effects

“Network Centric”

*Organizational
Behavior*

*Advanced
C² & Dynamics*

*NETWORK CENTRIC
MILITARY
ORGANIZATIONS...*

*...ARE INHERENTLY
HUMAN IN NATURE;
COLLECTIVELY &
INDIVIDUALLY*

“Knowledge Superiority”

Status

Shared understanding of situations and intents

Information Infrastructure Performance

Advanced communications & computing & content

Notional Model of Network Centric Ops

POC: CAPT Mark Tempestilli, USN, USNA DNCW

“Meta-Roles:”
Officers
Leaders
Warriors
Innovators
in NCW conditions

A virtuous cycle...
If guided & led correctly,
behavior and knowledge
become mutually reinforcing.

“Network Centric”
Organizational
Behavior



“Knowledge Superiority”
Status

Shared understanding of situations and intents

Effects-Based Outcomes

Best strategic, operational, tactical effects

Desired network centric dynamics resulting from Behavior modification, through >>

- Leadership, rules, values, motives, reinforcement methods, etc.
- Organizational frameworks, structure, roles, relationships.
- Cultural parameters, lexicon, metaphors, rituals (indoctrination, ceremonies, etc.).

Components of Competencies:
Knowledge
Skills
Aptitudes
Attitudes
Behaviors

Information Infrastructure Performance

Advanced communications & computing & content



Example Human and Organizational Challenges for FORCEnet Operations



STILL REFINING

- **ROLE, RELATIONSHIP, & TASK AGILITY**
- **REDISTRIBUTION of INFLUENCE & POWER; reevaluation of authority, responsibility, & accountability**
- **SUPPORT FOR LEARNING (Growth of useful understanding and reasoning ability), SENSEMAKING (cognition, etc.), REASONING (Forming the right questions, metacognition, and application of variety of mental models/paradigms), DECIDING (Answering the questions in actionable, highest value-added manner)**
- **DEALING WITH COGNITIVE LIMITS**
 - overload
 - recognition differential
 - Linearity
- **AVOIDING GROUP-THINK and other “Knowledge Pathologies”**
- **INFORMATION AND KNOWLEDGE MANAGEMENT in complex, virtual organizations and immersive, information-rich environments**
- **VALUE-ADDED OF KNOWLEDGE TO APPLICATION OF FORCE, MANEUVER, PERCEPTION MANAGEMENT, etc., IN ORDER TO ACHIEVE EFFECTS**
- **VALUE-ADDED TO UNLOADING STRESS & REDUCING FRICTION IN INTENSE, COMPLEX WAR-FIGHTING**



Determining NCW Competencies



“Our new leaders must be able not only to operate in this new environment, but also to create the emergent power of this new potential.”

Roles, competencies, and their components yield refined education, training & research requirements.

Meta-Roles → **Competencies** → **Components**

**Officer
Leader
Warrior
Innovator
in NCW
conditions**

(See the following slides.)

**Knowledge
Skills
Aptitudes
Attitudes
Behaviors**

and Applicable Measures



Also: *Faculty/Staff Competencies*



Roles, competencies, and their components yield refined education, training & research requirements.

Meta-Roles:

**Faculty/Staff
Leader
Teacher
Mentor**
for NCW &
the Info Age

“Undergraduate faculty and staff must similarly be able to nurture and facilitate the growth of midshipmen who will operate, create and lead the new power of NCW and the Information Age.”

Components:

**Knowledge
Skills
Aptitudes
Attitudes
Behaviors**

and Applicable Measures



Education & Enculturation Requirements Development



**Roles, competencies, and their components
yield refined education, training & research requirements.**

**Components of
Desired
Competencies:**

Knowledge
Skills
Aptitudes
Attitudes
Behaviors



**Engagement
Methods:**

Education
Training
Selection
**Enculturation
& Behavior Mods**



**Institutional
Requirements:**

Curricula
Facilities
Tech/Equipment
Media
Incentives
Performance Evals
other requirements



Caveat: Requirements Innovation



- *Imagine* an place that is a real “*leadership laboratory*,” where the new Network Centric junior leaders’ competencies, associated metrics, and their educational & cultural requirements are explored & developed for further mainstream injection.

Any institutionalized requirements generation system needs a healthy experimental and innovation component. At minimum, the system must be adaptive to potentially good ideas, e.g., a new software tool or a new educational technique. *At best*, it should include a dedicated “skunkworks,” where the skunkworks exists explicitly for the generation of good ideas and their direct application to the institution; is resourced well as an institutional imperative; and is especially protected from systemic antibodies that tend to kill anything new before it is mature enough to survive.



Example Competencies

STILL REFINING



- **Network Centric Officer**
 - Exceptional visual and multimedia communicator
 - Adept at social facets and consequences of distributed networking
- **Network Centric Leader**
 - Lead a network organization
 - Master of fluid, virtual organizational dynamics
- **Network Centric Warrior**
 - New command & control approaches,
 - Aligning tactical activity to strategic aims and operational intent
 - Affecting emergent, complex adaptive behavior
 - Master of knowledge context, abstraction, inference
- **Network Centric Innovator**
 - Overcoming vestigial cultural impediments
 - Experimenting, testing, measuring, learning & institutionalizing



Education & Enculturation (1)



**Education and enculturation
of budding Junior Officers
must be the main effort
in a needed bottom-up component
of Transformation to
Network Centric Warfare
and FORCEnet Operations.**

***Systemic undergraduate institutional change
is outstanding leverage...***

1200+ new Ensigns & Second Lieutenants every year.



Education & Enculturation (2)



- **Education & enculturation (imbuing/incorporating a new culture) go hand-in-hand toward necessary human and organizational change.**
- **Requires focus on:**
 - **New human competencies**
 - **New cultural elements and associated behaviors**
 - **Individuals and organizations**
- **Implies new educational and cultural approaches.**



Education & Enculturation (3)



- Investigation of new human roles, relationships and functions determines new human competencies & cultural elements.
- New competencies and cultural elements yield new educational & enculturation requirements.
- We already know a lot about the necessary new education & culture, can learn more by learning while doing, and must proactively co-evolve the education and enculturation of the human & organizational elements.
- Undergraduate education institutions must be treated as incubators for agile, innovative, Naval/Joint FORCEnet/NCW members, not knowledge/training assembly lines.



Immediate Recommendations



- ❑ **Define and/or refine emergent Junior Officer (JO) roles in NCW & FORCEnet through experimentation and research.**
- ❑ **Increase scope of recent Manpower/Personnel/HR requirements initiatives to include JO undergraduate education & enculturation.**
- ❑ **Intertwine Unit/Fleet/Force Experimentation with new Officer/Warrior development:**
 - Seek explicit feedback & analysis about human cognition, behavior and organizational dynamics of NCW & FORCEnet.**
- ❑ **Create opportunity for institutional innovation (*i.e., potential magnitude changes vs. incremental improvement*) at JO undergraduate institutions and realign the institutions accordingly (*incl. time, funding, manpower, flexibility, encouragement of non-critical risk-taking*).**
- ❑ **Support a bold “skunkworks”-style NCW education & enculturation effort at USNA and the other service academies..**



United States Naval Academy



OURS...to fight for



FREEDOM FROM FEAR



**We Remember...
So We Are Ready
For a New World.**



**CAPT Bob Dolan, USN, Class of 1981
One of 14 USNA alumni killed 9-11-01**



**USNA Midshipman Sentry
10 December 1941**





backup

USNA Alignment

Examples:

**FORCEnet Operations / NCW
Competencies and Principles**

IT and Information Resources

- Simulation and Lab equipment
- Robust connectivity

Academics, incl. Education and Research

- Explicit NCW /Fn/SP21 work
- Whole curriculum adapted
- Gaming

Professional Development

- New operational dynamics
- NCW/Fn/SP21 experiments
- Leadership in virtual organizations

Character Development & Ethics

- Virtual collaboration issues
- Ethos and trust on-line
- ROE in NCW

People and Culture

- NCW/Fn/SP21 in mainstream
- Brigade energized
- Faculty/staff ready & engaged

Institutional Structures and Systems

- NCW/Fn in USNA Organization
- Cross-disciplinary work

Facilities

- Center for the Study of FORCEnet
- Simulation Center
- Cross-functional space

Funding & Manpower

- Government Funds & Billets
- Alumni & Private Gifts
- Corporate Gifts

Communication & Cooperation

- Superintendent's Briefs
- DNCW Road-show
- Partnerships (NNWC, NPS, NWC, etc.)

Notional Model of Network Centric Ops

POC: CAPT Mark Tempestilli, USN, USNA DNCW

SYSTEM INTERACTION WITH:

ADVERSARIES,
TIME & SPACE,
ENVIRONMENT:
• GEOPHYSICAL
• CULTURAL
• POLITICAL

“Network Centric”
Organizational
Behavior

*Advanced
C² & Dynamics*

“Knowledge Superiority”
Status

Shared understanding of situations and intents

Effects-Based Outcomes

Best strategic, operational, tactical effects

*Desired network centric
dynamics resulting from
behavior modification,
induced by:
LEADERSHIP +
EDUCATION,
TRAINING,
& ENCULTURATION
in conjunction with new
FRAMEWORKS
PARADIGMS,
& MENTAL MODELS*

Knowledge
Skills
Aptitudes
Attitudes
Behaviors

Information Infrastructure Performance

Advanced communications & computing & content