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AN/UYQ-70 IT-21/SPAWAR Cooperation

DRS TECHNOLOGIES

LOCKHEED MARTIN

Raytheon

Q-70 IT-21/SPAWAR Cooperation

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- Q-70 IT-21 Services and Model
- Middleware
  - DCOM, CORBA, Java
  - JTA/DII COE
- Multiservice Information Distribution
  - Voice, Data, Sensor, Audio/Video, Collaboration

Q-70 IT-21/SPAWAR Cooperation (cont.)

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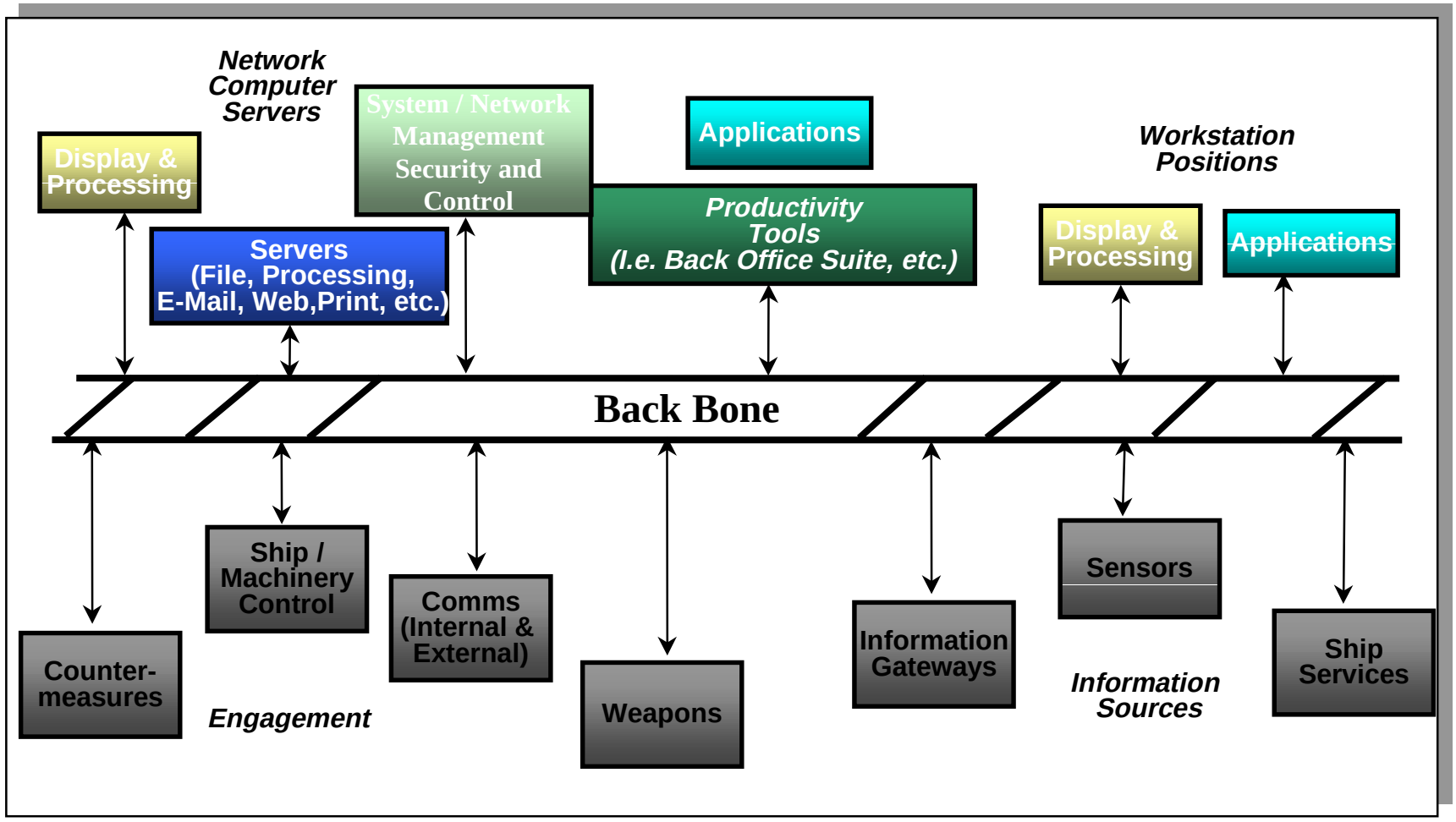
- Network Infrastructure & Resource Management
  - QoS, Remote Management, ASVADS, MTT
  - Switches, Gateways, Routers and Bridges
  - Internet/Intranet
- Security
- Challenges/Strategy
- Summary of Recommendations

Note that other issues like the VME Migration and Mission-Essential Variant (low-cost) enclosure are not discussed here!

Notional Network Centric Q-70 System Model



Typical Q-70 IT-21 Network Services To Be Provided

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- LAN Interconnection
- TCP/IP Support including Routing and Quality Of Service (QOS)
- Network Management Services
- Share combat system and weapons data between workstations
- Issue weapons firing and other battle orders
- Multiservice Information Distribution
- Electronic Dialog/Collaboration
- File Transfer Services
- Remote Access Services
- Domain Name Service (DNS)
- Electronic Mail including Attachments
- External Gateway Services
  - WWW, SIPR, NIPR
  - Electronic News
- Network Time Services
- Multi-level network security

Q-70/IT-21 Road to Success

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Multi-faceted approach required to augment legacy Q-70 architecture to support IT-21 Architecture.

- Broken into Four Major Thrusts
  - Middleware
  - Multiservice Information Distribution
  - Network Infrastructure
  - Security Architecture
- Requires Multi-Faceted collaboration between Navy Labs and Industry

Middleware

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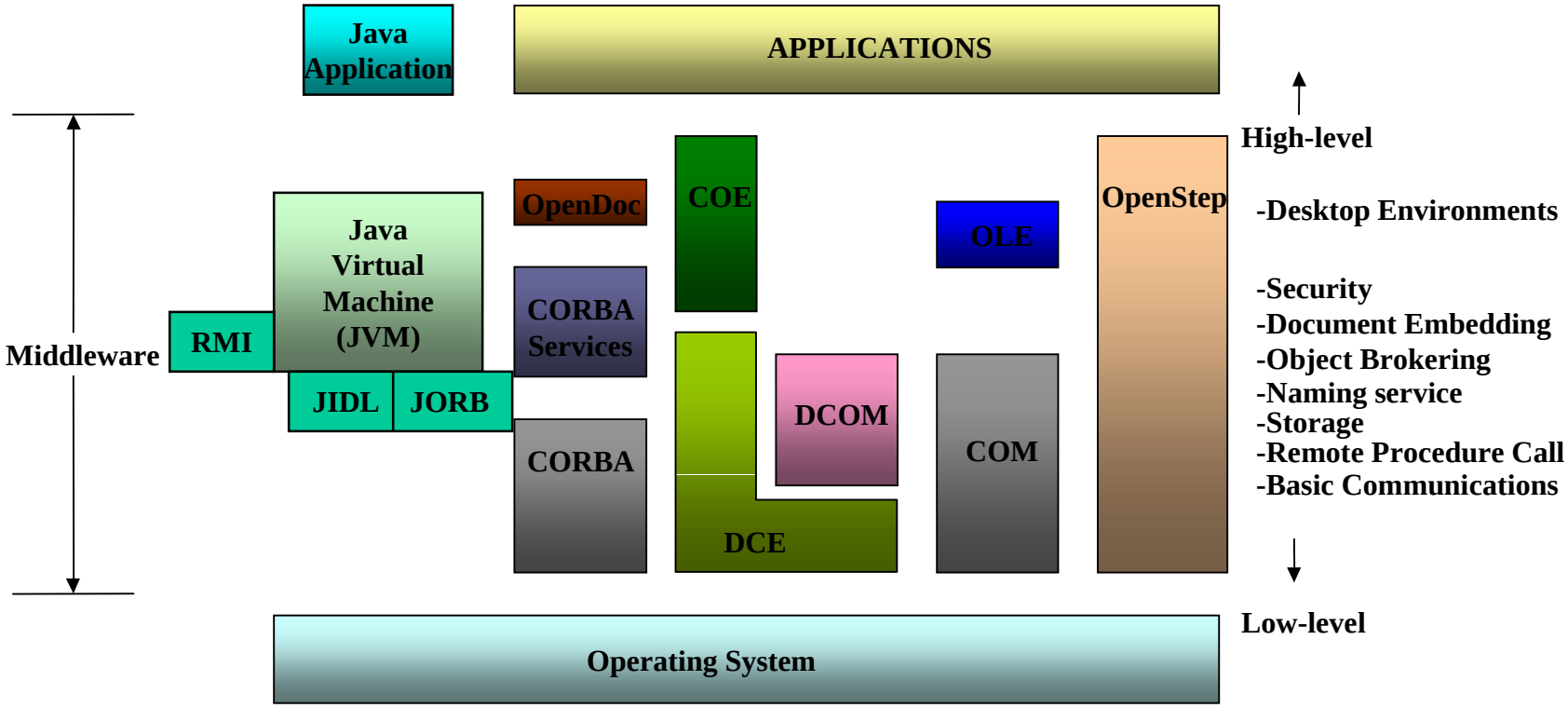
Define Middleware solutions that protect the Navy's investment in applications software

- Enable Navy to take advantage of changes in commercial technology with minimal impact to application software.
- JTA and DII COE activities include initial implementations of middleware aimed at warfighters.
- DCOM /Active-X, CORBA, and Java/JINI are commercial technologies that provide additional solutions for emerging Navy application requirements.
- Maintain and migrate Q-70 Unique middleware (BRM, Print Mgr, etc.) as well as consider additional middleware for RDSC, NTDS I/O, and others.

Middleware Model



JVM: Java Virtual Machine
JORB: Java ORB
JIDL: Java Interface Definition Language
RMI: Remote Method Invocation

ORB: Object Request Broker
CORBA: Common Object Request Broker Architecture
COE: Common Operating Environment
DCE: Distributed Computing Environment
OLE: Object Linking and Embedding
DCOM: Distributed Component Object Model

Middleware

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Technologies Being Investigated for Applicability to Q-70 Family:

DCOM/ActiveX - Microsoft Remote Procedure Call (RPC) Based Object Model; future uncertain; MFC Developer Kit includes toolset

ORB/CORBA - IEEE and COE standard, portable on POSIX compliant platforms; "Real-Time" ORBs under development, wide market acceptance and variety of toolsets available

Distributed Java/JINI - Language for platform independent applications, Java gaining wide commercial market acceptance; DOD evaluating for military applications; JINI is promising as a distributed object model for Java objects; wide variety of toolsets available

DOD Related Activities Applicable to Q-70 Middleware Development

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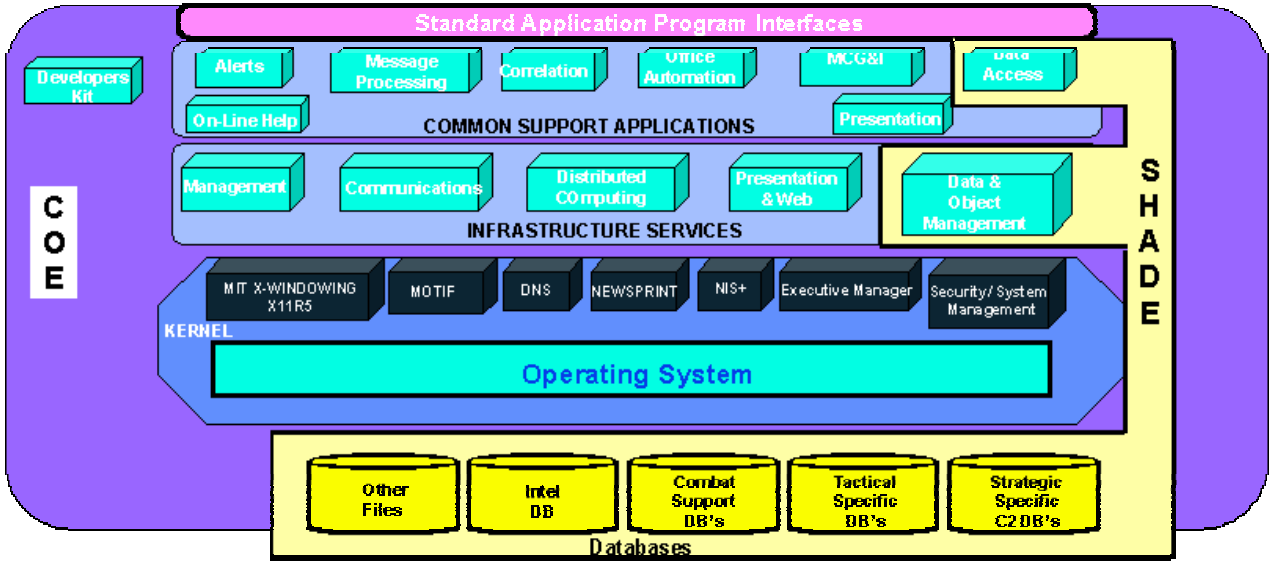
DII COE; A collection of reusable software components and a software infrastructure for supporting mission-area applications, guidelines, standards, and specifications.



•DII-COE; Defense Information Infrastructure Common Operating Environment
•SHADE; Shared Data Environment

SHADE: Provides an integration approach for data and databases (IAW Joint Tactical Architecture (JTA) necessary AND sufficient for interoperability.

Multiservice Information Distribution

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Multiservice Information Distribution includes sensor data, live video and voice information

- Current Navy solutions for data distribution include point-to-point or potentially obsolete network interfaces
- Q-70 needs to investigate methods to incorporate additional commercial technologies to meet evolving Navy requirements
- Methods need to be developed that utilize Multiservice Networking Technologies to reduce/eliminate multiple point-to-point interfaces while providing long term support

Sensor Data Distribution

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Sharing Combat System Sensor Information requires highly reliable data delivery

- Data delivery system must include low latency, deterministic, fault-tolerant and secure transport mechanisms
- Radar/Video Data Distribution requires high-bandwidth as well as the above transport mechanisms
- Promising advances in sensor processing algorithms and networking technology such as compression technology and increased bandwidth capabilities make this feasible
- A Next Generation Radar Scan Converter that bridges the gap from point-to-point to network based distribution is required

Potential Q-70 Solutions for Multimedia Data Distribution

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- Multimedia (voice, video, telephony)
  - Widely accepted and standards based solutions are commercially available, designed to run on variable QOS links
  - Numerous commercial multimedia conferencing applications available
- Shared Applications
  - Enables collaborative decision making, widely accepted and standards based solutions are commercially available
  - Most conferencing applications also include collaboration features
- Predominant Standards currently include ITU H.323, T.120 and IETF RTP/RTCP

Q-70 Network Infrastructure

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Q-70 product offerings will be enhanced to provide common networking infrastructure.

- A fundamental component of IT-21 and current combat systems is an underlying network architecture to share data between users.
- Sharing data requires more than network interface cards; a network consists of switches, routers, bridges and network interface cards, as well as the software and tools to manage the network resources.
- The Q-70 product offerings will be enhanced to provide a common networking infrastructure which includes hardware (switches, routers and bridges) and software (SNMP agents/MIBS, ASVADS clients/servers).

Q-70 Network Infrastructure (Cont)

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- AEGIS is using ASVADS and MTT to help manage their network; investigate this approach for non-AEGIS applications.
- The management, security and control of networks resources
  - Resource management and performance monitoring
  - Lessons learned from HiPer-D and ADCON-21
  - Quality of Service
  - Firewall and Gateway functionality

Q-70 Network Security Infrastructure

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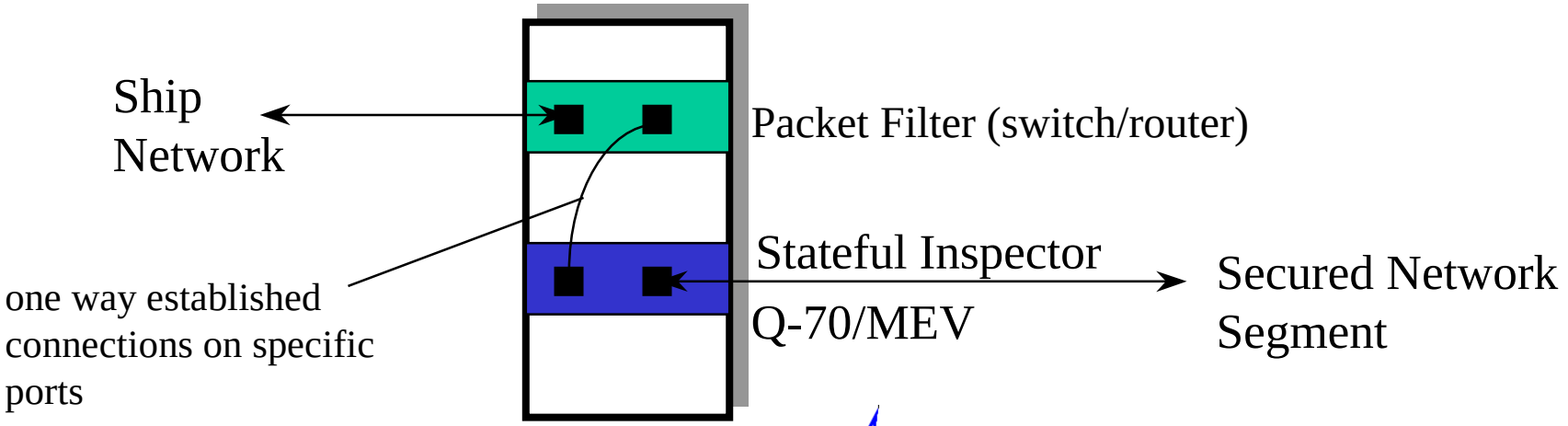
Network Centric computing/infrastructure will require "Stateful Inspectors" at numerous points on the networks

- Critical system objects must be protected from not only external attacks, but internal as well
- Combination of switch/router to perform first-level packet filter security (and reflexive access lists), followed by a Q-70/MEV "Stateful Inspector" box to form a two-level Firewall.



Challenges

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The Challenge for the future is to bring the IT-21 network centric computing to mission critical applications

- Need solution for fast failover redundancy in existing mission critical systems (FDDI is obsolete)

- How Do Mission Critical and Mission Essential Systems Coexist
  - Can Mission Essential support mission critical requirements
  - Running Mission Essential applications in a mission critical environment
  - How do Mission Critical and Mission Essential systems coexist on a common network infrastructure

- How does IT-21 Thin Client-Server Model fit into Q-70

Strategy

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The Q-70 IT-21 partnership is focused on synergy, and capitalizes on investment made by both programs

- Establish Q-70 Test Suite for advanced system development, interoperability demonstration, and technical/operational evaluation.

- Establish a working relationship with SPAWAR to:
  - Develop/implement a Q-70 Mission Critical Equipment interface to NWI
  - Capitalize on SPAWAR networking expertise
  - Enhance Q-70 product offerings through interaction with SPAWAR, Q-70 Users, and support labs.

Q-70/SPAWAR Cooperation

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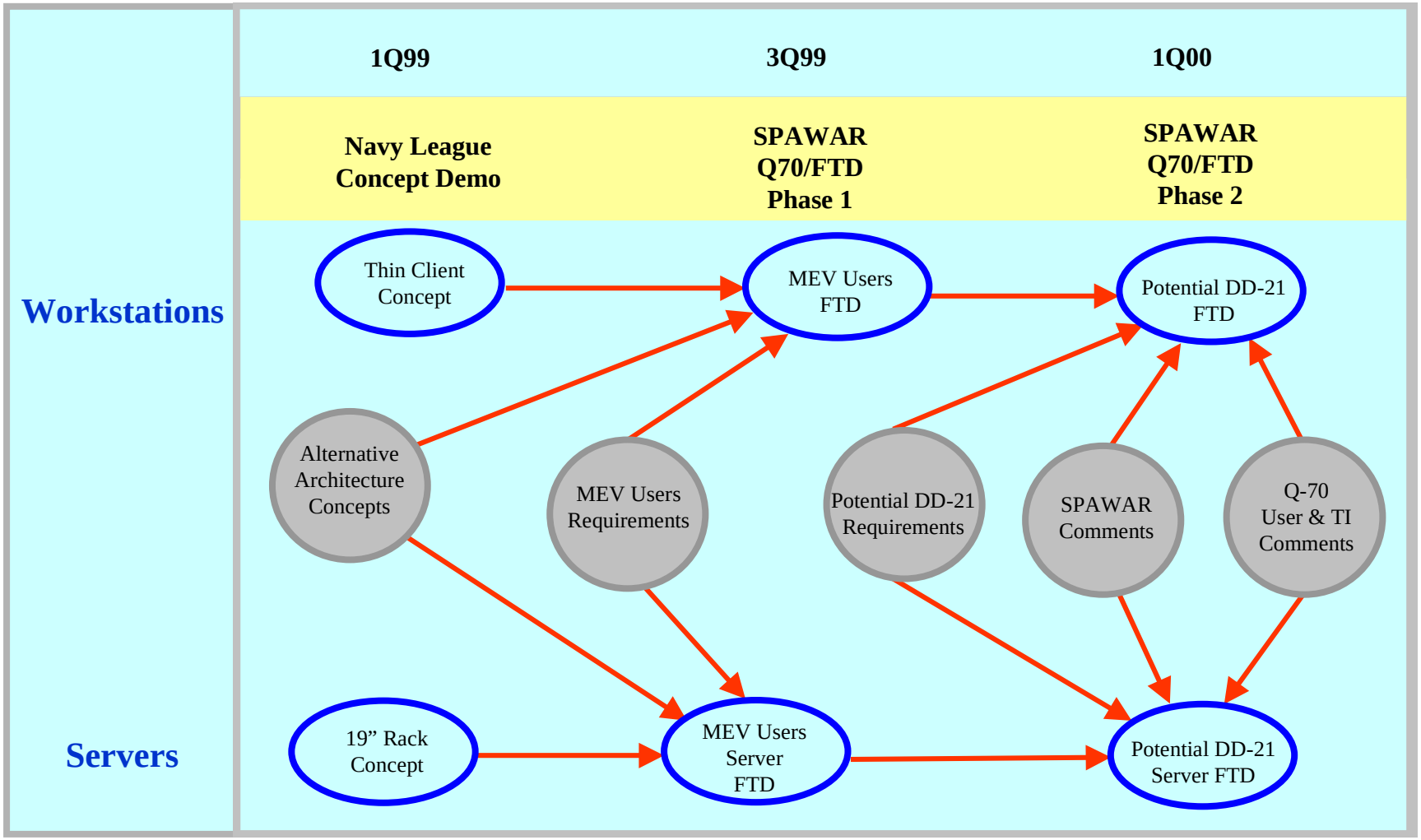

Summary of IT-21 Recommendations

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- Formalize NAVSEA / SPAWAR relationship (i.e. organizational roles, responsibilities, and commitments).
- Commence investigation of Q-70 / IT-21 technology "areas of interest".
  - Middleware
    - DCOM, CORBA, Java, DII COE
  - Multiservice Information Distribution
    - Sensor Data
    - Multimedia (voice, video, telephony)
  - Network Infrastructure
    - Devices, Management Agents
    - Multi-level Security