C4ISR Integration Reduces Cost and Risk

Integration of C4ISR mission electronics is proven to reduce manpower, improve situational awareness, and simplify the acquisition and production process for the shipyard.

Command and control, emergency operation, and other tactical centers have the opportunity for major performance improvements with cost effective, well-planned C4ISR upgrades.
The customer requires a single C^4ISR integrator for cost and risk reduction.

The process results in a C^4ISR system that also better serves the operators, maintainers, and mission

| Multifunctional User Terminals | • Access to all voice communications via a single integrated terminal allows a rich communications environment to be managed naturally with multiple circuit monitoring, integrated security, and easy transition of active circuits  
- Mission responsiveness increases dramatically through situational awareness  
- One box to mount, power, cable, administer, and maintain |
| Console and Cabinet Layout | • Eliminate artificial separation by individual C^4ISR domains  
- Consoles designed for optimal control/display for the operator  
- Cabinet design serves the conflicting demands of cable plant, space, weight, power, maintenance access, and integration testing |
| Networks | • Determine network requirements by subsystem to protect quality of service  
• Implement networks at the C^4ISR level to minimize hardware, consolidate network management, and address security threats at a system level |
| Topside Design | • By intelligent decisions on antenna selection and placement and below decks equipment design, communications quality and SIMOPS capability can be significantly improved |
| Shared Services | • Training, logistics, power backup, status monitoring and testing are all candidates for consolidation across C^4ISR domains |

Similar benefits apply to maritime platforms and land-based tactical operation sites such as:
- Emergency Operation Centers
- Harbor Operations Centers
- Training Ranges
- Communication Stations
- Regional Command Centers
Integration of all C4ISR elements simplifies the procurement, installation, operation and maintenance of the mission electronics while reducing cost and risk.

**Command and Control**
- Ensure situational awareness through tactical subsystems and effective information management
- Support of Command and Control decision making and results monitoring

<table>
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<tr>
<th>Common Operating Picture</th>
<th>Large Screen Displays</th>
<th>Enclaves</th>
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<tr>
<td>Multi-Level Security</td>
<td>Class. and Unclass. LAN</td>
<td>MLS Workstations</td>
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<tr>
<td>Certification &amp; Accreditation</td>
<td>Host to Customer SW</td>
<td>Electronic Charts</td>
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</tbody>
</table>

**Comprehensive Shipwide Communications Integration**
- Minimizing equipment cost, space, weight, and power
- Enhancing situational awareness of crew

**Topside Antennas and Sensors**
- Engineered for maximum simultaneous operations
- C4ISR integrator must work closely with shipyard
- LOS and SATCOM communication antennas
- RADHAZ, HERF, HERP, HERO, and EMCON

<table>
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<tr>
<th>SIMOPS</th>
<th>Blockage</th>
<th>CCTV</th>
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<tr>
<td>Mast Design Review</td>
<td>Navigation</td>
<td>SATCOM Placement</td>
</tr>
<tr>
<td>Antenna Placement</td>
<td>Sensor Placement</td>
<td>Coverage</td>
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</tbody>
</table>

**External Communications and Data Links**
- Greatly expanded connectivity of networked forces
- Upgrade-friendly and vendor agnostic
- Simplified cable plant, operations and reduced manpower

<table>
<thead>
<tr>
<th>GMDSS Functionality</th>
<th>Air Ops</th>
<th>MF, HF, VHF, UHF</th>
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<tr>
<td>Maritime WAN</td>
<td>Tactical Circuits</td>
<td>Commercial and MIL SATCOM</td>
</tr>
<tr>
<td>Global Networks</td>
<td>Data Links</td>
<td>Security</td>
</tr>
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</table>

**Integrated Interior Communications**
- Connecting users wherever for Situational Awareness
- A single voice terminal per position for all voice services
- Complete interoperability of all voice systems
- Consistent HMI and security management

<table>
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<tr>
<th>Wireless Portables</th>
<th>Announcing/Alarms</th>
<th>Tactical &amp; Administrative</th>
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<tr>
<td>Integrated Terminals</td>
<td>Intercom</td>
<td>Internal &amp; Radio Nets</td>
</tr>
<tr>
<td>Sound Powered</td>
<td>Command &amp; Control</td>
<td>Point-to-Point</td>
</tr>
</tbody>
</table>

**Multi-Media, Multiple Technologies, Serving the User**
- RF, baseband, wired, wireless, internal, external
- Maximum interoperability across technologies

**The Power of Communications Integration**
**Low Risk Production**
- Integration risk retired before system gets to shipyard
- Integration across C4ISR domains reduces cost, space, weight, and power
- L-3 has an excellent track record for on-time delivery and smooth shipyard integration
- Experienced install teams and specialized facilities

**Customer Support**
- Simplification of complex responsibilities with one contractor to lean on
- Committed teammate focused on your program
- Resident on-site support augmented by as-needed engineering services

**Proven Mission Performance Capability**
- Staff expertise in C4ISR assures quality and performance
- Interoperability drives mission success
- Capability enhanced by cumulative experience
- Situational Awareness improves platform response times
- Remote control & monitoring simplifies training and maintenance

**Flexibility/Growth**
- System architecture and flexible interfaces support customer choice of equipment vendors and custom CFE
- Scalable from submarines, LCACs and patrol boats to amphib
- Low cost Tech Refresh enabled by architectural approach

**Life Cycle Support**
- Training curricula, on-site or factory courses
- Custom training centers dedicated to the platform
- Efficient depot operations across programs
- Full spectrum ILS services
- Extensive computer based training

**Low Risk Design**
- Topside analysis, modeling, and design are critical to lead ship and program success
- Cumulative experience and design reuse drives down NRE while retiring risk
- Design of bridge and consoles is critical to platform operation
- TEMPEST, IA, and security are L-3 strengths driving risk down
Integration occurs both within each C4ISR element and as the elements are physically and functionally brought together to serve the platform missions.

### Navigation Systems
- Modern networked sensor suite
- Integrated Bridge for unified universal display environment
- Integration enables greatly reduced crew size
- Reduced footprint from elimination of stove pipes

<table>
<thead>
<tr>
<th>Nav &amp; Signal Lights</th>
<th>Safety &amp; Warning</th>
<th>Electrical Alarms</th>
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<tbody>
<tr>
<td>C2 &amp; Bridge Consoles</td>
<td>Nav Communications</td>
<td>Searchlights</td>
</tr>
<tr>
<td>Navigation Sensors</td>
<td>Navigation Aids</td>
<td>Track Data</td>
</tr>
</tbody>
</table>

### Surveillance Sensors and Miscellaneous
- Additional sensors and systems round out the C4ISR complement
- These feed into other subsystems and networks
- Topside design must accommodate sensors along with the communication antennas

<table>
<thead>
<tr>
<th>TACAN</th>
<th>Identification Systems</th>
<th>Indicating, Order &amp; Metering</th>
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<tr>
<td>Multi-Mode Radar</td>
<td>EO Infrared Surveillance</td>
<td>Unmanned Aircraft</td>
</tr>
<tr>
<td>Surface Search Radar</td>
<td>Passive Countermeasures</td>
<td>Meteorological &amp; Oceanographic</td>
</tr>
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### Video Systems
- Quality of life, training and mission critical applications
- Broadcast, stored media and real-time surveillance
- Distribution, display, editing and real-time camera control
- Increasingly essential to operations

<table>
<thead>
<tr>
<th>Antennas and Receivers</th>
<th>High Sensitivity, Low Light</th>
<th>Network Connectivity</th>
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<tr>
<td>Surveillance</td>
<td>Video Recording/ Switching</td>
<td>Fixed, Pan, Tilt, and Zoom</td>
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<tr>
<td>Entertainment &amp; Training</td>
<td>Video Distribution System</td>
<td>Gun Weapon System Video</td>
</tr>
</tbody>
</table>

### Computers and Networks
- Interconnecting unclassified and classified equipment
- Receive, display, process, exchange, and transmit digital data, voice and video
- Network security and data storage with ability to host customer C2 software
- Ability for crew to perform network management long term

<table>
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<th>Host for Customer SW</th>
<th>Network Security</th>
<th>Switching, Routing, VPNs</th>
</tr>
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<tbody>
<tr>
<td>Network Infrastructure</td>
<td>Data Storage</td>
<td>IP Encryption</td>
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<tr>
<td>Digital Data, Voice &amp; Video</td>
<td>WANs, Shoreline &amp; SATCOM</td>
<td>Network Management</td>
</tr>
</tbody>
</table>
Excellence has propelled L-3 along its path to worldwide trust for communications and C^4ISR integration

Working with many generations of technology across a wide variety of platforms, organizations, and nations, L-3 has led the way with integrated and automated communications. Customer satisfaction has enabled each stage of its growth.

Pioneering internal and external communication system automation in a MIL-Spec world
- Trident Submarine Integrated Radio Room – Two operators controlling 23 racks of automated strategic communications equipment with system availability of 0.999998
- Aegis Integrated Voice Communication System – Rugged construction and redundant architecture saved lives when the USS Princeton hit a mine in the Persian Gulf

Successfully transitioning to a COTS product base while retaining domain expertise
- MarCom® Baseband Switch, first deployed on Los Angeles Class submarines – Two-minute accurate comm plan evolution in compact switch
- MarCom® Integrated Voice Communication System – Tactical situational awareness with universal voice access from a single integrated terminal
- Symphony ™ Automated Communications Manager – Eliminates need for onboard experts
- Continually expanding feature set

Expanding the customer base domestically and internationally
- Canadian Arctic/Offshore Patrol Ship (AOPS), Egypt Fast Missile Craft (FMC), RNZN ANZAC Frigate, RAN HMAS Sirius, and Malaysian Corvette
- U.S. Coast Guard Cutters and Shore Commands
- Interagency Operations Centers

Increasing integration scope, easing the procurement headaches for new construction
- Integrating partner and commercial subsystems and equipment for broadcast, entertainment, wireless, networking, navigation, and other C^4ISR domains
- U.S. Coast Guard National Security Cutter – Completed on cost and on schedule while meeting or exceeding performance requirements
- Royal Australian Navy Landing Helicopter Dock – Large-scale interior/exterior communications and networks
- U.S. Coast Guard Fast Response Cutter – Extremely successful C^4ISR for a “game-changing” cutter
When a customer chooses L-3 as its C4ISR integrator, it gets:

**C4ISR Expertise** - higher quality decisions within the C4ISR domain.

**Specialized Facilities** - L-3 Operations facilities, tools, and procedures retire risk before equipment delivery.

**Programmatic** - Simplification of complex responsibilities with one contractor to lean on.

**Risk Management** - C4ISR details closely managed by L-3 reduce technical, program, and schedule risks. Protection of shipyard schedules is L-3's greatest responsibility.

**Lower Cost** - More design reuse, more efficient integration across subsystems, and streamlined activities in the shipyard and on ship.

**Improved Customer Relationships** - L-3's proven ability instills trust with the customer which can enhance the shipyard’s relationship with the customer on C4ISR issues and opportunities.

**L-3’s impact on the platform or facility and mission readiness**

**User Interface Optimization** - Console and workstation optimization at the C4ISR level will arrange controls and displays to suit the user needs rather than being driven by the structure of the equipment procurement organization.

**Remote Control and Maintenance** - C4ISR equipment can be remotely operated, monitored, and diagnosed for faults requiring fewer personnel. Enabling accurate and repeatable configuration of external communication circuits without requiring organic technical expertise is a game changer.

**Mission Performance** - Improvements in C4ISR increase responsiveness of the entire platform or facility by enabling situational awareness for the staff/crew, providing an optimized human machine interface across functional areas, and reducing dependence upon detailed technical training for operation of systems such as external communications. Organic personnel are able to assess situations, anticipate requirements, and execute responses in a more timely manner. The net effect is dramatically improved mission performance.

**Future Proofing** - Attention to capacity margins coupled with innovative architectures simplifies technology insertion making it more affordable and more likely to implemented.

**L-3 ensures:**

- On-time performance
- Early risk retirement
- Improved mission performance and situational awareness
- Automated operation