Artillery Regimental Data System Advanced Development Model

ARDS ADM - Replication Issues

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# Artillery Regimental Data System Advanced Development Model ARDS ADM - Replication Issues

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Plan

- ARDS ADM
- Constraints and design drivers
- Data Distribution & Replication
- Testing
- Conclusions
1. Some words on ARDS ADM
ARDS ADM

• Provides automated tools and interfaces for the close support field artillery organization

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Data Model Based

• Represents and manipulates model elements which correspond to real entities

• Provides integrated view of the battlefield situation

• Allows straightforward definitions of new views

• Maximises the opportunities for integration and interoperation with other forces and nations systems
Active database

1. Operator Enters Target
2. Create Target
3. “New Target” Notification
4. Post Event “New Target”
5. New Target
6. Retrieve Target Data
7. View Update

ARDS Database (node A)
2- Constraints and design drivers
Operational Environment Constraints

• Time is critical
  – Prioritization

• Survivability
  – Site Independence
  – Elimination of single points of failure

• Communications
  – Limited throughput
  – Key-up time
  – Collisions
  – Network Failure
Design Drivers

- Broadcast medium
- Data redundancy
- Recovering of lost/destroyed data
- Use of COTS
- Modularity
- Configurability
3 – Data Distribution & Replication
Replication issues

- COTS Replication not suitable
  - 1500 vs 200 bytes
  - 9 network interactions (radio key-up)
  - COTS solution optimized for consistency
  - Peer to peer
Replication Issues (Cont.)

- Transaction Integrity
- Data Ownership
- Connectionless
- Limited bandwidth
Replication Characteristics

• Solution layered on top COTS DBMS
• Trigger based post transaction
• Negative acknowledgment
• Store and forward
• Recovery
• Data Ownership models
  – Single, dynamic and shared
## 4 - Testing

<table>
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<th>Description</th>
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<th>DDS Message Size (bytes)</th>
<th>NET Tx Data Size (bytes)</th>
<th>Tx Time (secs) PRC25+RTU (@&lt;100 bytes/sec)</th>
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<td>110 (104)</td>
<td>144</td>
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<tr>
<td>Standard Transaction</td>
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<td>10</td>
<td>551 (385)</td>
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<td>1355 (776)</td>
<td>874</td>
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</table>
5 - Conclusions

- Tactical communications had limited throughput
- COTS Replication not adapted to military environment
- ARDS/ADM DDS is optimized for timeliness and for continued operations but data base consistency can not be guaranteed