Human Machine Interface Considerations in COTS Command and Control Systems

GSAW 98 - Common Operator Interface Break-out Session

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Market Trends

• “Full Custom” system development is no longer a reality
  – Cost
  – Time to deliver
  – Technologically out-dated upon delivery

• COTS products are driving command & control architectures
  – Complete COTS systems
  – Meeting specific functional needs
  – Underlying backbone

• System maintenance and Human Machine Interface (HMI) are significant considerations in the use of COTS
HMI Considerations for COTS Systems

• **Commercial market is driving the COTS software vendors**

• **The HMI is an integral part of each product**
  – Designed by vendor to maximize product usability
  – Frequently tightly integrated with underlying functionality
  – Products with large, supported installation bases need to maintain version compatibility

• **Market forces have not driven vendors to standardize HMI**
  – Commercial marketplace has not adopted the various HMI standards
  – Vendors have a significant investment in existing HMI’s

• **Operations concepts can drive for HMI implementation**
  – One operator performs many functions versus one operator dedicated to a single function
  – Skill level of operators
COTS Architecture Options

- Build a system of smaller COTS components which provide toolkit features
- Utilize large products which address multiple command and control functions
- Integrate smaller, “best in their class” products
Toolkit Option

• **Select products with the ability to modify the HMI**
  – Select products which have a commitment to keep pace with technology
  – Utilize tools provided with the product to build an HMI in the product’s environment
  – API’s provide ability to construct a common HMI across multiple functions
  – Less options as there is a small pool of products

• **Requires additional investment**
  – Development
  – Maintenance
  – Can be performed by any qualified organization

• **Resultant system is a mix of COTS and NOTS**
Large Product Option

- Design systems around large products with integrated functionality
- Provides a single HMI for multiple functions
  - Common “look & feel” across functions, e.g. telemetry processing, commanding, ground equipment control
  - One interface to learn
- Difficult to modify HMI to meet specific requirements
  - Requires expensive involvement of COTS vendor
  - Results in non-standard version which is difficult to maintain
- Frequently lack complete API’s suite for integration with other products or functions
- Still may require use of multiple HMI’s in “One operator performs many functions “ scenarios
Multiple Product Option

- Viable in situations “One operator dedicated to a single function” scenarios or where operator skill level is high
- Common implementation in commercial environments
- A necessity in heterogeneous workstation environments
- Allows the selection of the product with the most functionality
- Operator training is eased through selection of products which can be tailored
  - Minimal customization using toolkits
  - The ability to save operator configurations make acceptance easier
Future Prospects

• Until commercial marketplace drives it, COTS vendors will not focus upon a specific HMI standard
• Toolkit products are in use today and offer the flexibility to meet specific program requirements, although the resultant systems are more like the traditional custom systems
• People who fly satellites for profit have learned to manage multiple HMI’s and will continue to do so