

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**