



**communications**

**Storm Control Systems, Inc.**

***An Adaptable and Market-  
Driven Command and Control  
Architecture***

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# COTS Solutions: Market Demands

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- **COTS products offer significant benefits to complex system implementations**
- **While benefits are acknowledged, concerns and criticism still exists regarding some COTS-based approaches**
- **Top concerns center around some basic attributes**
  - ***Functionality***
    - Ability to support necessary functions (either too much or too little function)
  - ***Flexibility***
    - The ability of the product to easily adapt to mission specific requirements and end user ops concepts
  - ***Cost***
    - The cost to maintain and evolve the COTS products
  - ***Control***
    - The level of dependency of the end user on the COTS vendor

# L-3 Storm Approach & Lessons Learned

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- **Long term COTS product provider**
  - *L-3 Storm has been a COTS Command and Control product provider for more than a decade*
- **Mission Unique Development/Integration**
  - *During this time, L-3 Storm has adapted baseline COTS products to support numerous missions with mission unique requirements and ops concepts*
- **Lessons Learned**
  - *Sometimes “learned the hard way” how to adapt COTS products to support mission unique requirements*
- **Extensive R&D**
  - *Decided to invest R&D to define a comprehensive architecture capable of evolving to support future requirements.*

# InControl-NG Architecture Characteristics

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- **A Software Product AND a Comprehensive Architecture**
  - *InControl-NG designed to serve as an operational software product and a comprehensive system architecture to support evolution*
- **Use of proven tools and processes**
  - *Architectural design & implementation initially based on Rational processes and tools*
  - *Migration to RM-ODP to support more rigorous architectural views and evolution*
- **Component-based design**
  - *Well defined components and to support flexibility and encapsulation*
- **Use of well-defined interfaces**
  - *IDL and well structured/documented interfaces to support third party product integration and system evolution*
  - *XML file formats to support data definition*
- **Support for and use of industry standards and broad market technologies**
  - *CORBA, Java, C++, XML, UML, RM-ODP, CCSDS, CCSDS/SLE, etc.*
- **Careful use of open source products**
  - *Careful selection and use of accepted open source products*
- **Emphasis on platform independence**

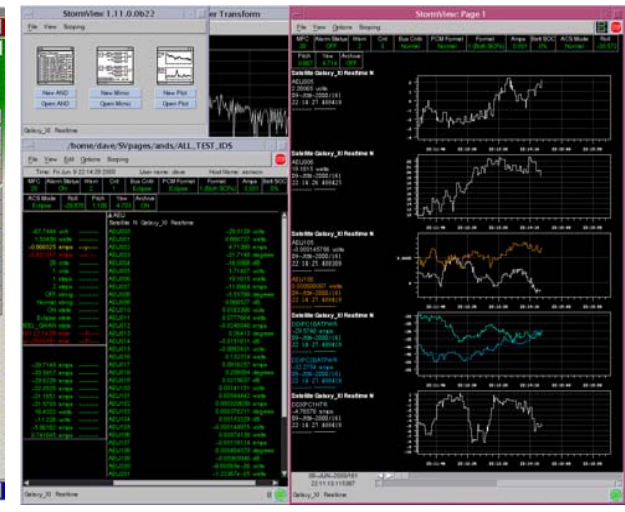
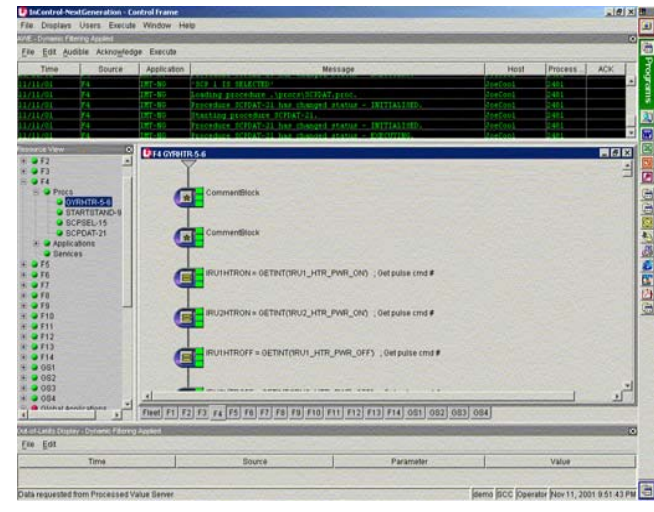
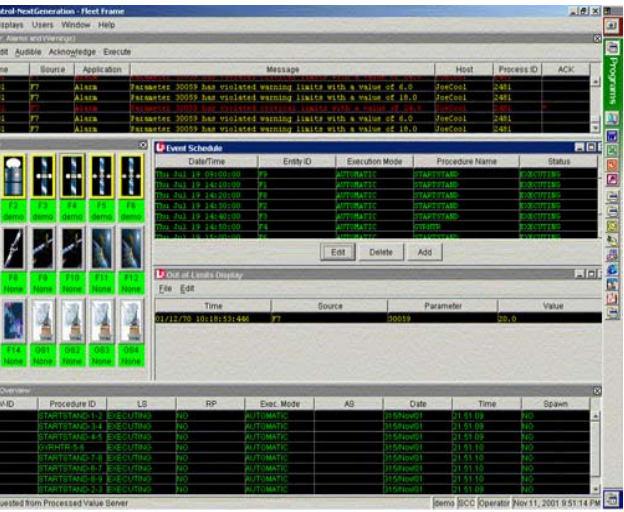
# Support for Mission Unique Requirements

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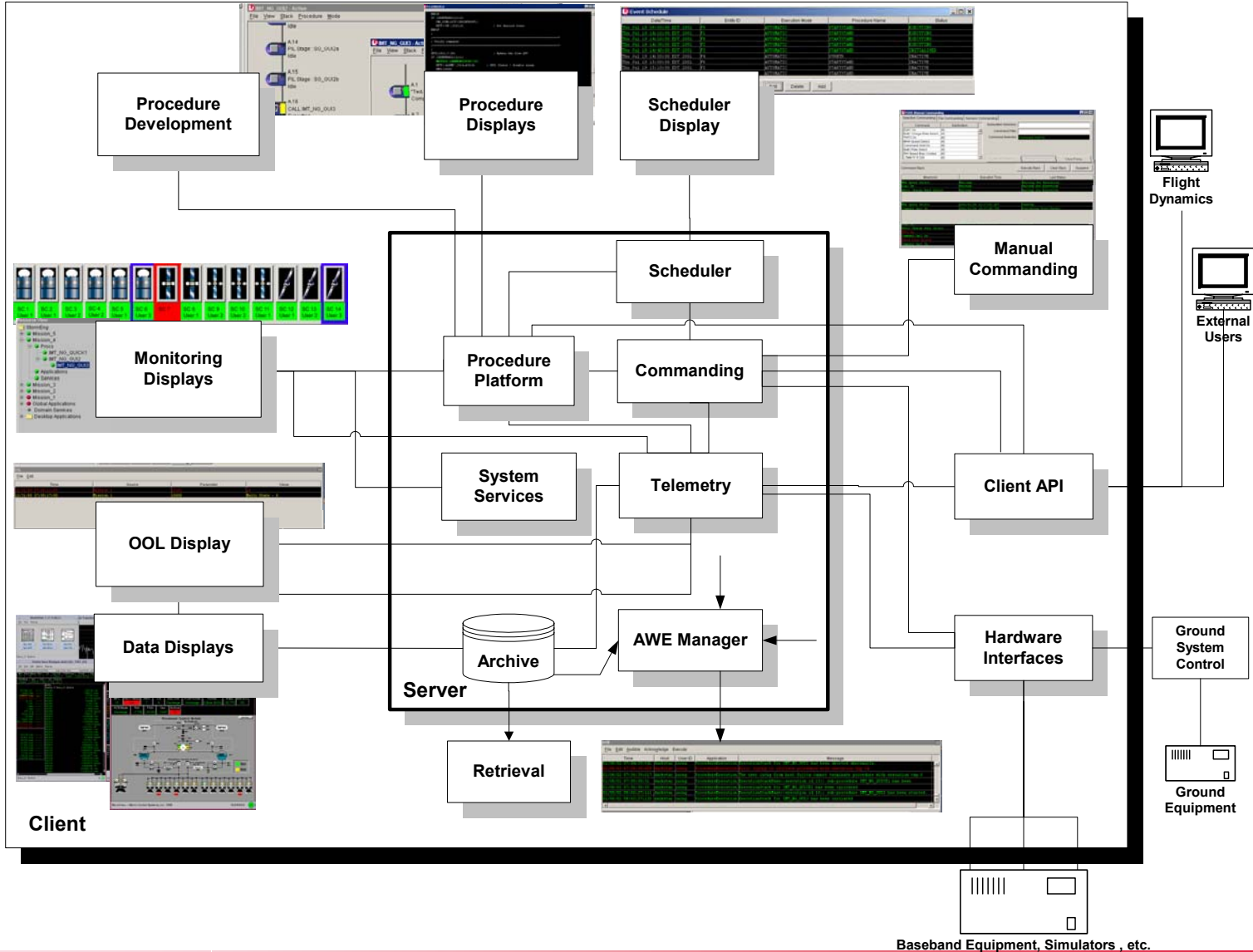
- **Significant goal to satisfy mission unique requirements with minimal NRE**
- **Use of “layers”, “strata”, and design patterns to support unique requirements**
- **Goal to minimize/eliminate impact to “core” system components**
  - *Minimize development/integration*
  - *Simplify maintenance*
- **Support the ability to add unique processing**
  - *Use of well known design patterns for dynamic functions*
    - **Use of Chain of Responsibility design pattern to support any spacecraft specific on-board command queue**
    - **Use of interceptors in the telemetry engine to allow mission specific processing to be added with no impact on the core functionality**

# Modular and Adaptable User Interface

- Support for multiple system “views”
  - Configurable displays and ops concept support
  - Independent implementation (from baseline functions) – supporting flexibility



# Support for Multiple Display Views



# Summary

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- **Creation of a product and an architecture**
- **Support for industry standards for system expansion and evolution**
- **Strong component based design**
- **Well defined API's**
- **Use of layers, strata, and design patterns to minimize NRE and support evolution**
- **Integrated and flexible user interface design**

