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Balancing Generic Software Component Design with Tailored COTS Solutions

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Overview slide example

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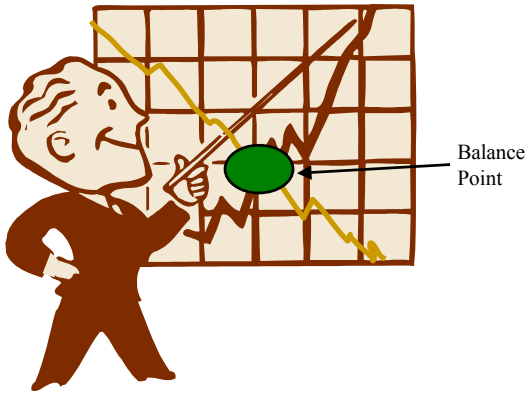
Position Statement

- By balancing the use of tailored COTS solutions with generic software component design, a program can implement the best solution for:
  - ✓ Maximizing customer needs and requirements that are met by the final solution
  - ✓ Minimizing the cost and schedule time needed to deploy the final solution
- To successfully meet its mission, cost, and schedule, a program must find the appropriate balance between custom requirement needs in designing generic software components vs. the degree of tailorability in its COTS



Balance is the Key Driver

Applicable Raytheon COTS Experience

- Programs have included numerous Commercial, Civil, and Government customers
- Company has been integrating tailorable COTS and out-of-the box COTS products for over 10 years
- Developed tailorable COTS solutions totaling over 2 million of lines of code
- Implemented COTS solutions on over 40 programs worldwide

Company has many years of COTS experience across many programs

Raytheon Tailorable COTS Products

- **ECLIPSE™ Software**
  - ✓ Satellite Command & Control Software
- **ESC™ Software**
  - ✓ Ground Station Equipment Monitor & Control
- **EQUINOX™ Software**
  - ✓ Satellite & Ground Station Mission Management Planning
- **NOVA Software**
  - ✓ Network Optimization, Visualization, and Analysis
- **VISTA Software**
  - ✓ Visualization of Satellite Dynamics
- **CCT Software**
  - ✓ Control Channel Toolkit

Tailorable COTS Satisfy Customer Requirements While Minimizing Costs!

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COTS Usage on Current Programs

- **Integration of a variety of COTS software:**
  - **Raytheon Tailorable COTS Including:**
    - ✓ **ECLIPSE™ Software**
    - ✓ **ESC™ Software**
    - ✓ **EQUINOX™ Software**
  - **Externally Purchased COTS Including:**
    - ✓ **HPOpenView**
    - ✓ **HP Service Desk**
    - ✓ **Remedy**
    - ✓ **Opnet**

Current large development efforts would have been 2-3 million LOC.

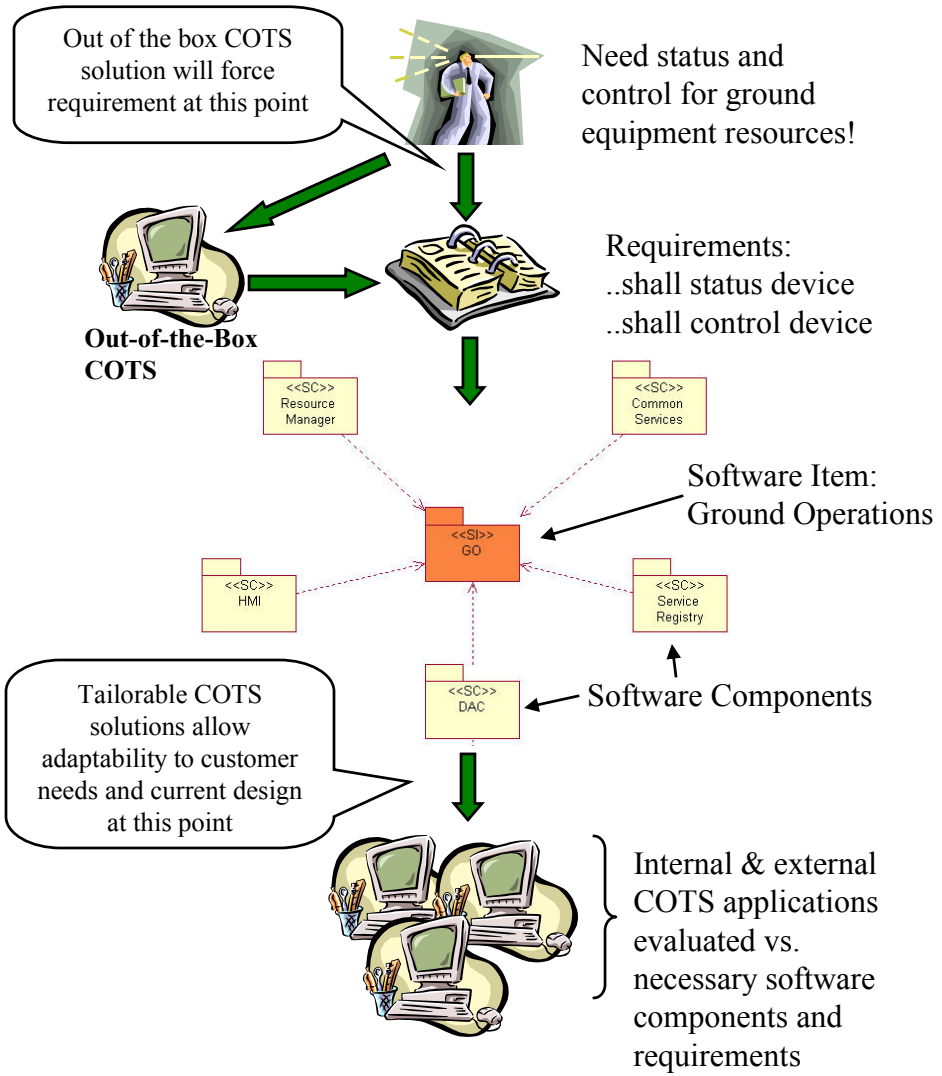
Reuse of our tailorable COTS has reduced this effort to approximately 500k LOC !!

Integration of Raytheon's tailorable COTS with standard industry COTS products allows for greater modularization

Large Amount of COTS Design & Integration Required

Process Impacts on Program Example

- **Customer needs mapped to functional requirements**
- **Functional requirements mapped to generic software items**
- **Software items decomposed into software components for more design resolution**
- **Software items and detailed software components compared against available internal and external COTS implementations for selection and tailored needs**



Requirements and Design Phases are Affected by Type of COTS Usage

Generic Software Component Driven Design (Benefits)

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- Benefits to using generic software component design without regard to current out-of-the-box COTS source code implementation(s):

  - ✓ Allows for out-of-the-box ideas to expand, improve, and/or replace current COTS components or even an entire COTS application as a program matures or evolves over time (i.e. planning for the future)
  - ✓ Illustrates more clearly the strengths and deficiencies of proposed COTS applications to the generic software requirements & components required by the program
  - ✓ Allows for better alignment of customer needs vs. existing COTS components
  - ✓ Allows a generic framework for integration needs vs. existing COTS integrations
  - ✓ Strongly Identifies the Logical View of the architecture for the Rational Unified Process (RUP) approach

Improves Communication, Innovation, and Alignment

Generic Software Component Driven Design (Obstacles)

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- Obstacles to using generic software component design without regard to current COTS source code implementation(s):
  - ✓ Conflicts between multiple program designs pulling a COTS application in different directions (Diverging baselines)
  - ✓ Potential for continued redesign of a software component multiple times (Iterative cycles)
  - ✓ Existing COTS interfaces and integrations may have to be reworked creating cost and schedule impacts in addition to components being redesigned
  - ✓ Introducing level of risk by requiring changes to current tested COTS implementations to meet new custom needs
  - ✓ Does not strongly support the Implementation View of the architecture for the Rational Unified Process (RUP) approach

May Introduce Cost, Schedule, & Risk Issues

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Take away messages

- System design and integration can be much more closely tied to customer needs by designing to generic software components rather than out-of-the-box COTS implementations which force a customer to fit their mold

- However, a strong tailored COTS product-line presence can assist in bridging many of the obstacles:
  - ✓ Eliminate the “reinvention of the wheel” for each new program
  - ✓ Provide realistic cost and schedule impacts based on experience and estimation models such as SEER from previous implementations
  - ✓ Provide general COTS direction to avoid conflicting program direction or wasted rework
  - ✓ Provide a strong framework of software reuse that has been formally tested and operationally proven

- By focusing on using tailored COTS solutions vs. out-of-the-box COTS solutions to meet generic software component design, a program is much more likely to meet its objectives

Programs must find the correct balance to be successful!

Questions?

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Q&A Period