An Introduction to FACE Data Modeling

Future Airborne Capability Environment

TES-SAVi Training Package

Modeled using the TES-SAVi FAME tool suite

Version Alpha, dated February 2016

Overview

- The FACE Challenge, the FACE Vision
- FACE Data Model Architecture
  - Data Model Architecture Overview
    - Conceptual Model
    - Logical Model
    - Platform Model
    - Unit of Portability
- Summary
- Stick around for an Example
  - Real-time Data Modeling

The FACE™ Challenge

- Today's military aviation **airborne systems are "stove-piped"** – developed to and for a unique set of requirements by a single vendor

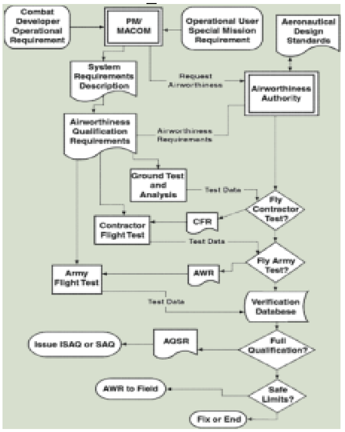
- Embedded airworthy mission/safety-critical systems **require extensive testing** and they have **extensive** airworthy **qualification** requirements and **processes**, which affects the rapid deployment of capabilities across the military fleet of disparate platforms

- **DoD Procurement does not support** software systems **reuse**

- **Missing is a place for Integrators to "shop"** for Warfighting Capabilities that promote interoperability

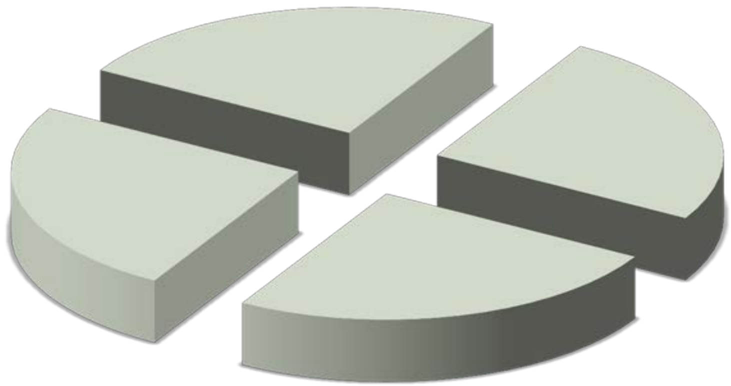
- The "on-ramp" for understanding and developing to the FACE Standard and FACE Data Modeling eludes many

AWR Process



The FACE™ Vision

Components of the FACE™ Vision



- Technical Standards for a software COE
- Process Improvements for Portable and Reusable Capabilities
- New DoD Procurement Guidelines
- A Military Software Store Front

- ***But still,…***
- The "on-ramp" for understanding and developing to the FACE Standard and FACE Data Modeling eludes many, and is hampering product development
- This FACE Data Model Introduction provides insight, illustrates concepts, and presents an example FACE data model

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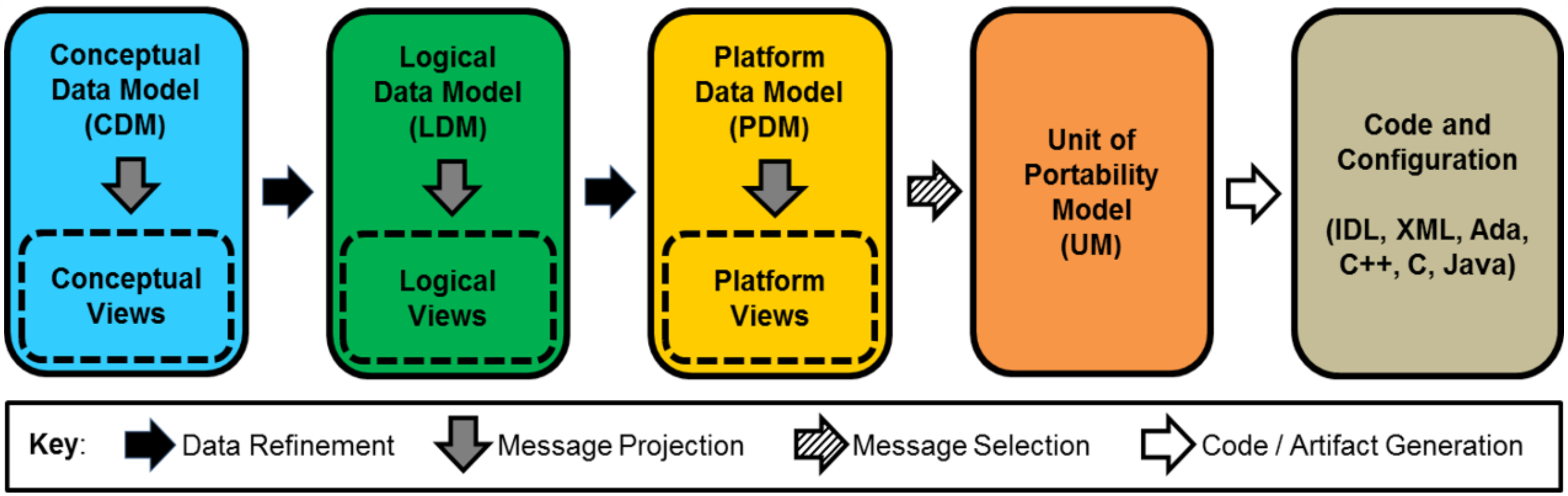
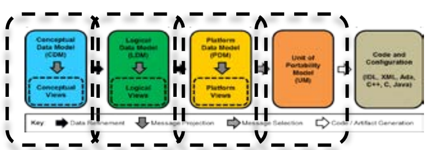
Data Model Architecture Overview

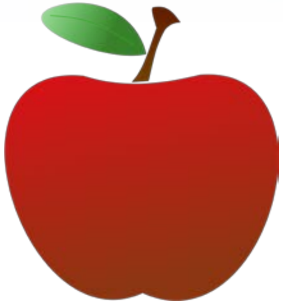


- FACE Data Model
  - Top-down design methodology, through data refinement, eases integration and reuse across FACE product line of integrated products
  - Serves as means to achieve specificity in interface definition
  - Provides data definition; semantic, quantitative measurement, physical

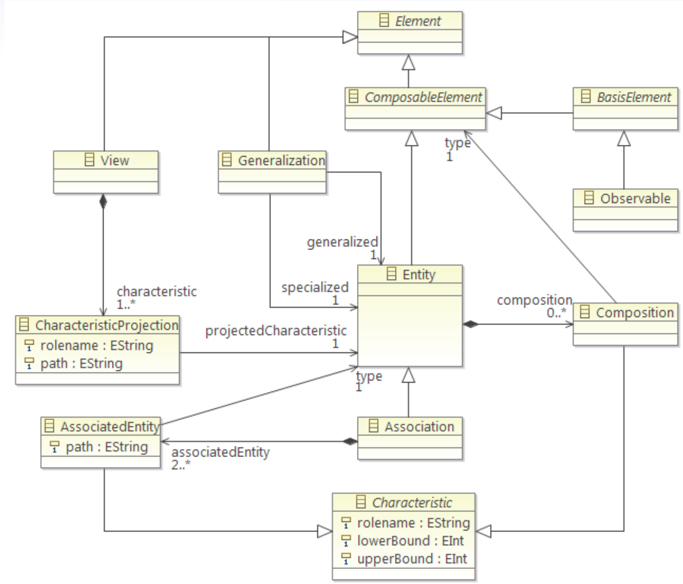


Our legend identifies levels of architecture models,
as we traverse down the architecture

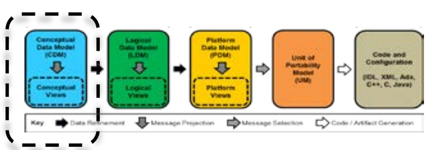
Conceptual Data Model



Conceptual Meta Model



- Semantic Model
  - Defines world in textual descriptions
- Key Model Elements
  - Observable - Basic Element of Conceptual Data Model
    - E.g. Distance, Velocity, Volume
  - Entity – Model Element with Attributes defined by Observables
  - View – Model Element consisting of grouping of Entity Attributes



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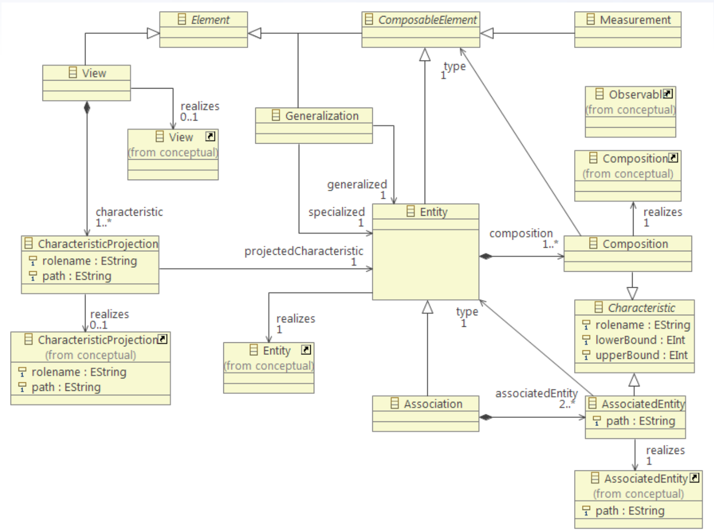
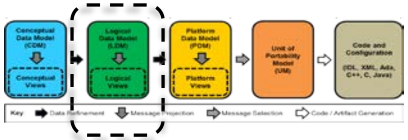
Logical Data Model

Logical Meta Model

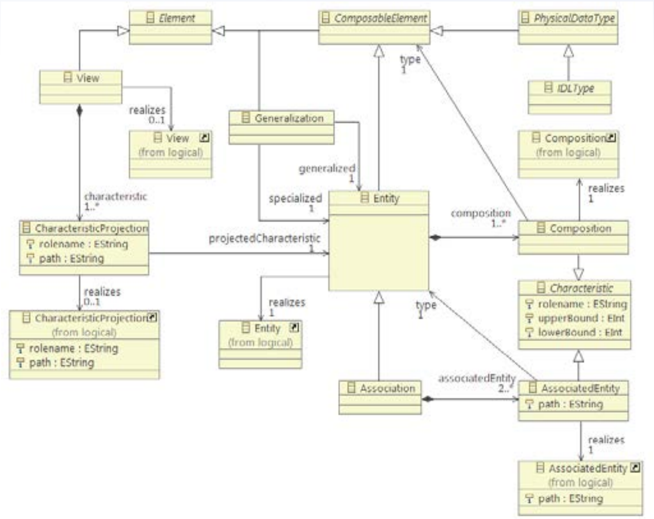


- Measurement Model
  - Defines world in quantitative measurements
- Key Model Elements
  - Measurement - Basic Element of Logical Data Model
    - E.g. Distance, AngularVelocity, VolumeMeasurement
  - Entity – Model Element with Attributes defined by Measurements
  - View - Model Element consisting of grouping of Entity Attributes

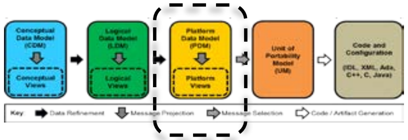


Platform Data Model

Platform Meta Model

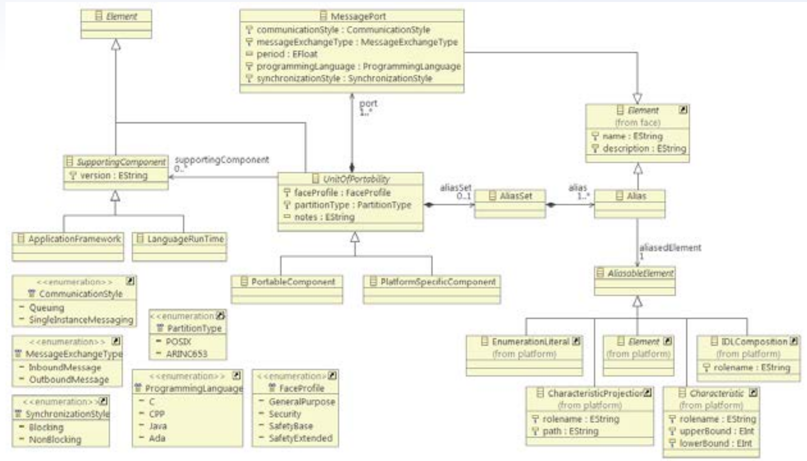


- Physical Model
  - Defines data of model in physical representations
- Key Model Elements
  - IDL Type - Basic elements of Platform Data Model
    - E.g Boolean, String, Double
  - Entity - Model Element with Attributes defined by IDL Type
  - View - Model Element consisting of grouping of Entity Attributes

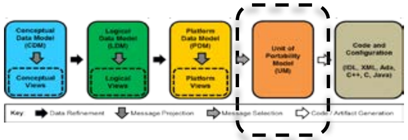


Unit of Portability

UoP Meta Model



- Component and Interface Model
  - Defines the component and its interfaces
- Key Model Structures
  - Unit of Portability (UoP) - Defines component FACE segment and profile
  - Message Ports - Define interface and data exchange characteristics



Summary

- The FACE Data Modeling is challenging, but surmountable
- The FACE Data Model Architecture is very useful
  - Top-Down Design enables ease of Integration and Reuse
  - Multi-layers (Conceptual, Logical, Platform) serves to promote reuse
  - Serves as means to achieve specificity in interface definition
  - Provides data definition; semantic, quantitative measurement, physical
- There is an *On-Ramp* for Modeling
  - More in-depth training
  - Effective tools for manage development efforts

- Stick around to see an Example – using TES-SAVi's FAME
  - Illustration of a Real-time Data Modeling

Questions

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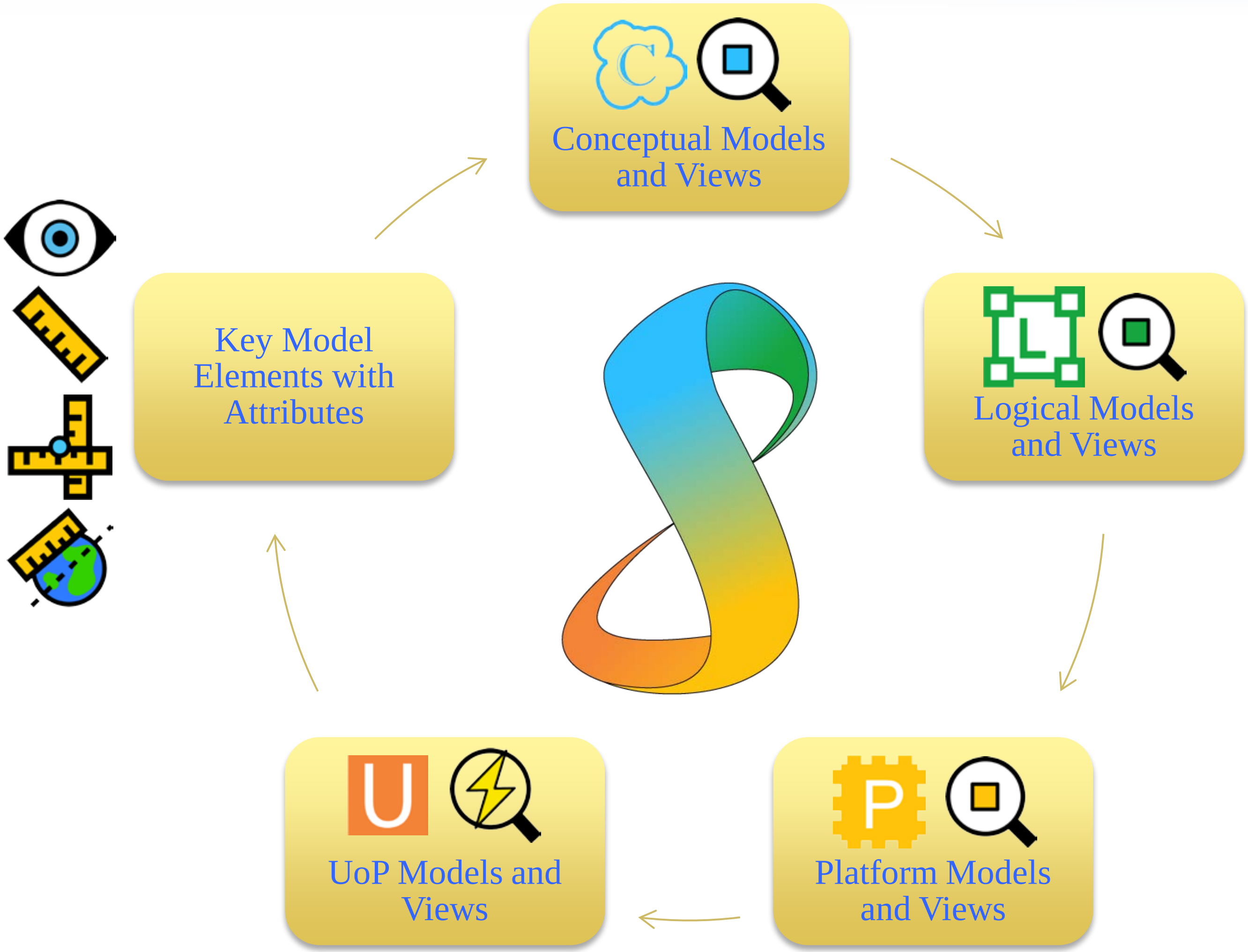
For additional Information

visit www.TES-SAVi.com,

or contact StephenS@TucsonEmbedded.com

TES-SAVi's FAME™



Data Model Example – Using FAME

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The Problem
Avionics Software Complexity

- Dramatic increase in the complexity of highly integrated Avionic Systems
- Current Business Practices (acquisition and development) are unaffordable. They cannot keep pace and deliver timely the advance capabilities needed to maintain warfighter dominance

Avionics cost and complexity

The unaffordable trend in modern systems

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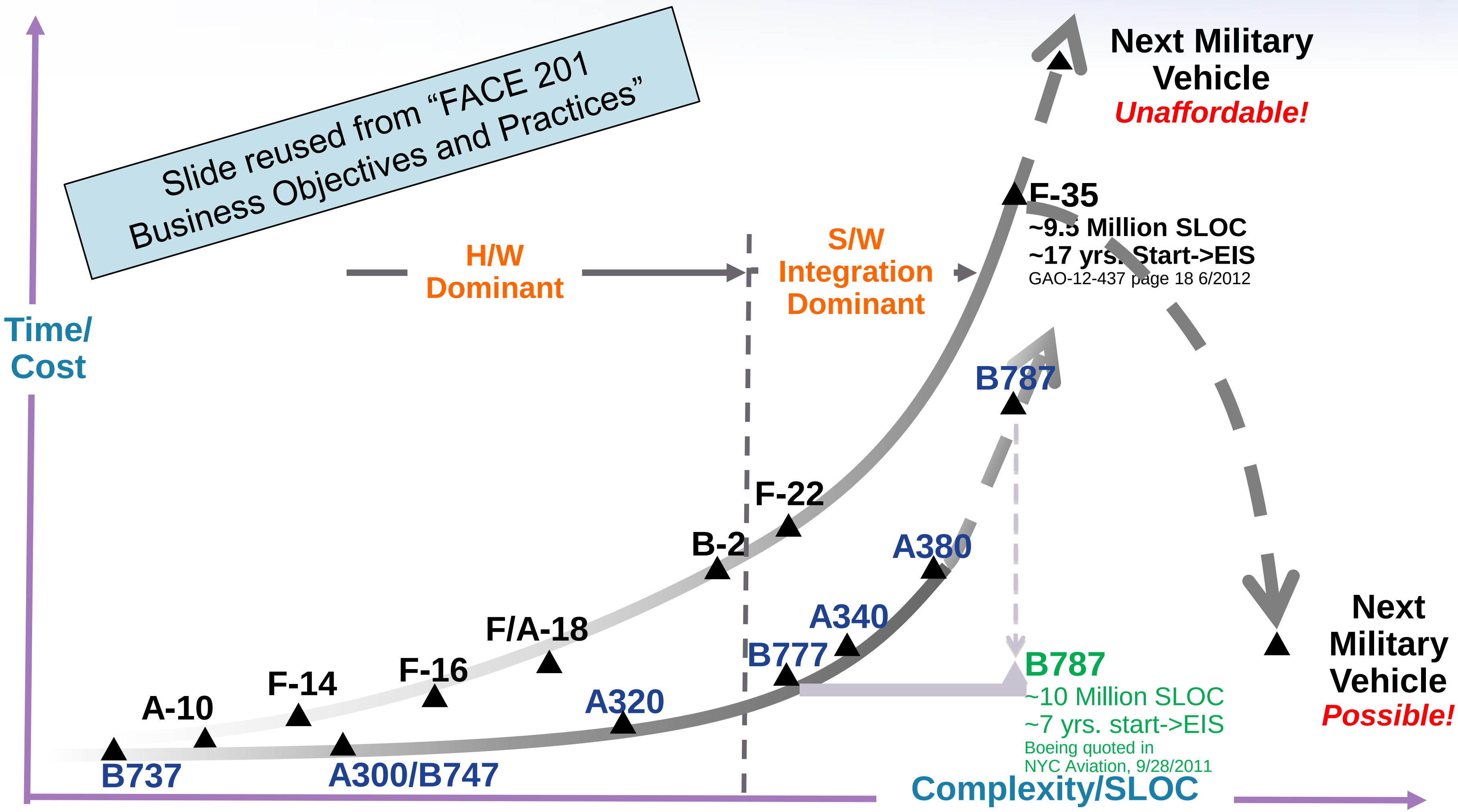

GE's CCS, "open" IMA computing and tools reset "the curve" for the Boeing 787

"…Paradoxically, some of the most complex areas - such as the software-intensive common core system [CCS] at the heart of the 787's avionics and systems architecture - have proved robust and stable…CCS has been rock solid for us."

Scott Fancher, Boeing 787 vice president and general manager, 02/15/2010 Aviation Week & Space Technology

The Solution : FACE

- FACE Is
  - A Consortium of government and industry working together to provide solutions to the big difficulties of aviation software
- FACE Provides
  - A technical standard and meta-model for developing software applications/capabilities that can be hosted on well-defined Open System Architectures
  - Guidelines for the acquisition of FACE products
  - Marketplace for FACE components