Common Range Integrated Instrumentation System (CRIIS)

National Defense Industrial Association

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NDIA
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CRIIS Program Overview

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Outline

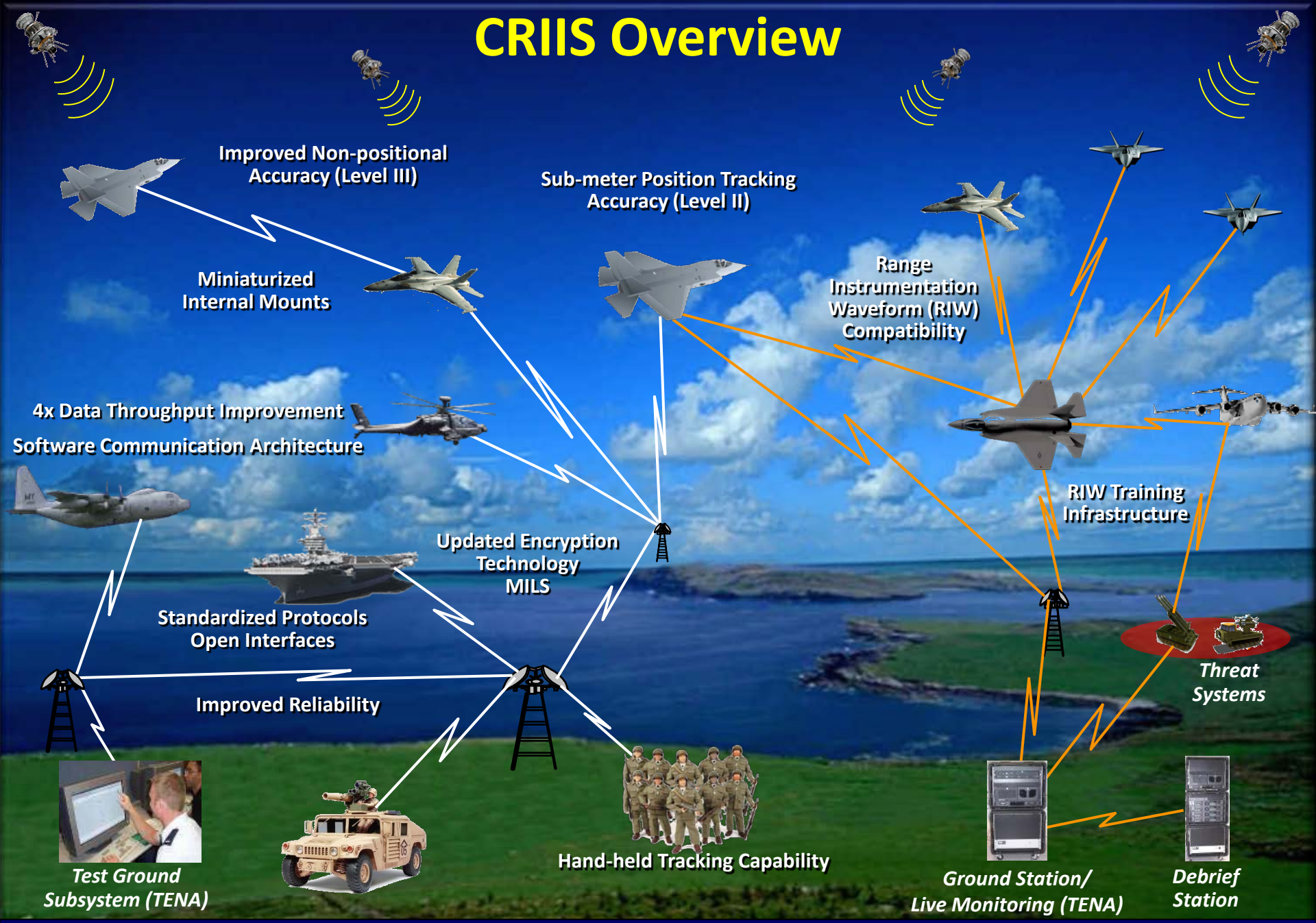
- Background
- Strategy
- Achievements
- Summary

Background

- Primary Function: Test Data Collection
  - Land, Sea, and Airborne Platforms (Including F-22A and F-35)
  - Requires Equipment More Accurate than System Under Test (SUT)
- CRIIS Provides:
  - High Accuracy Time, Space, Position Information (TSPI) of SUT
  - Secure Datalink(s) Transmit Real Time TSPI and Aircraft Data
    - Avionics
    - Weapons Targeting and Status Data
    - Aircraft Status
- CRIIS Maximizes Interoperability Among T&E Ranges
- Potential Use on Training Ranges
- CRIIS Development Funded by Central Test & Evaluation Investment Program
  - CRIIS Production and Sustainment Funded by Individual Services

CRIIS is A Test Range Replacement of the Existing GPS Based ARDS With Advanced Datalink, TSPI, Security Features

CRIIS Overview



Test Package Directive (TPD) Issued 7 Jul 10

Functional Configurations

INCREMENT 1
Configurations 1, 2, 3

Level IA TSPI
Short Range DL

Config. 1
Dismounted Soldier

Level IB TSPI
Mid Range DL
Encryption

Config. 2
Low Dynamic Vehicles

Config. 3
Ship-to-Shore

Level IB TSPI
Extended Range DL

INCREMENT 2
Configurations 4, 5, 6

Level II TSPI
High Throughput DL
Encryption

Config. 4 Pod

Config. 5 Moderate Accuracy
Multi-Package Internal Mount

Config. 6 Moderate Accuracy
Single Package Internal Mount

Capability to Run RIW

INCREMENT 3
Configurations 7, 8

Config. 7 High Accuracy
Multiple-Package Internal Mount

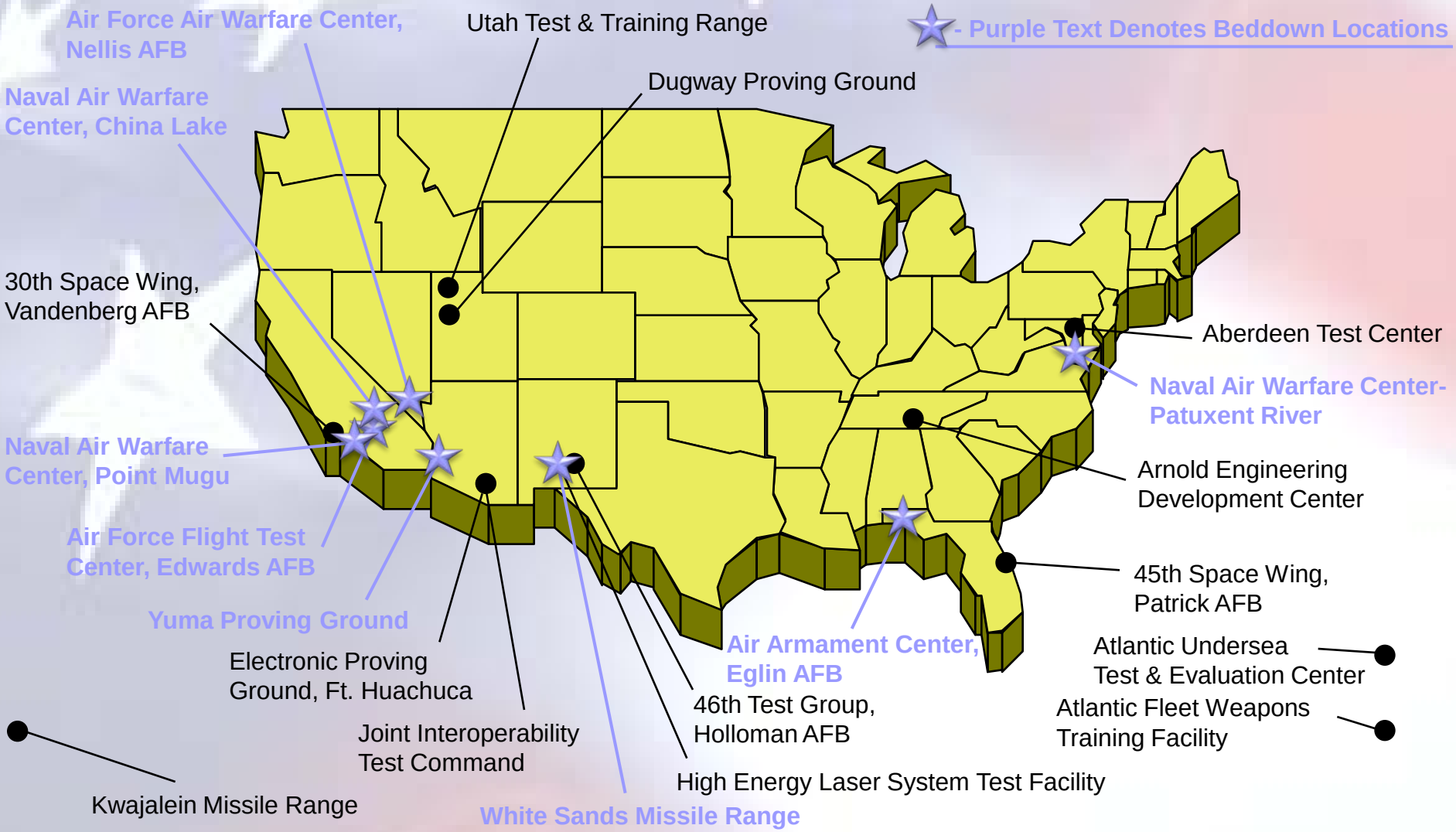
Level III TSPI
High Throughput DL
Encryption

Config. 8 High Accuracy
Single Package Internal Mount

Ground Subsystem

Configuration	1	2	3	4	5	6	7	8	GS
Most Probable Qty	300	460	65	102	94	32	28	11	8

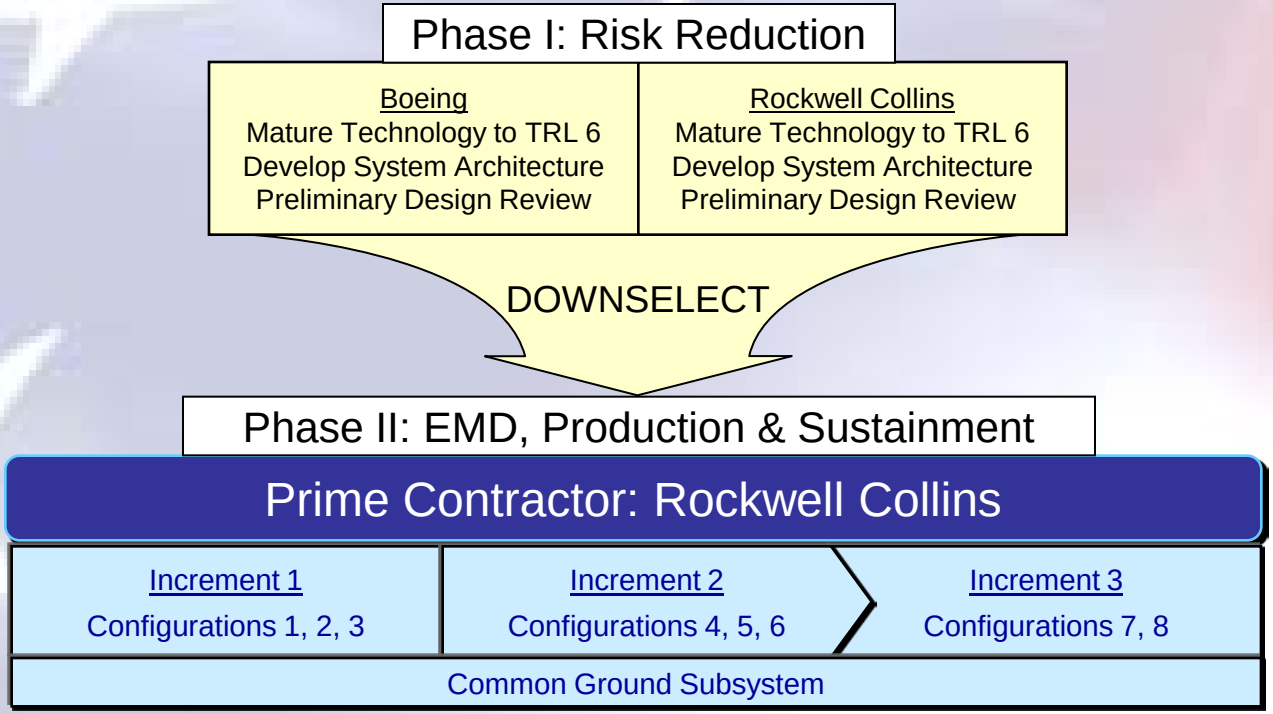
Major Range and Test Facility Base (MRTFB) and Initial Beddown Locations



Key Performance Parameters

Configuration	Requirement
Dismounted Soldier	• Man-carriable • Less than or equal to 2.5 lbs
Low Dynamic Vehicle	• Less than or equal to 1 m Horizontal RMS TSPI accuracy on ground vehicles
Ship-to-Shore	• 250 nmi datalink range
Moderate Accuracy	• 0.5 meter horizontal RMS accuracy on fighter aircraft • Top Secret (TS) encryption capability • Datalink throughput greater than or equal to 400 kbps per frequency within ARDS occupied bandwidth
Pod	• Mass properties consistent with ARDS, within constraints
1-box IM	• Fits on F-18 6L Bay Door
1 or 2-box IM	• Fits internally in F-35 and F-22
High Accuracy	• 0.5 -meter horizontal RMS accuracy on fighter aircraft with non-positional accuracies better than the Level II requirements
1-box IM	• Fits on F-18 6L Bay Door
1 or 2-box IM	• Fits internally in F-35 and F-22
Net Ready	• The capability, system, and/or service must support Net-Centric military operations. The capability, system and/or service must be able to enter and be managed in the network, and exchange data in a secure manner to enhance mission effectiveness. The capability, system, and/or service must continuously provide survivable, interoperable, secure and operationally effective information exchanges to enable a Net-Centric military capability.

Acquisition Strategy



- Risk Reduction and EMD Funded by CTEIP
- Production and Sustainment Funded by Services
- CRIIS Program Executes All Phases

Phase I Accomplishments

- ✓ Matured and Demonstrated TSPI Technology
- ✓ Reduced Risk, Demonstrated High Throughput Datalink Capabilities
- ✓ Developed System Architecture and Preliminary Design
- ✓ Developed Life Cycle Support Concept
- ✓ Updated Test Capabilities Requirement Document to Match Demonstrated Capabilities and Synthesized System Performance Specification
- ✓ Completed Phase II Source Selection and Awarded Phase II EMD Contract
- ✓ Obtained Affordable Fixed Prices for Prototypes, Production, and Sustainment

Rockwell Risk Reduction/Technology Maturity
PDR Complete 26 Feb 10

TSPI
- Global Differential Corrections
- RTK Algorithms for Position Accuracy
- Rockwell 24 Channel SAASM Receiver
- UTC Kalman Filter for Non-Positional TSPI
- Honeywell's HG1700 and HG9900 IMU

Datalink
- Modified Rockwell Quint Network Technology (QNT) Radio
  - Time Division Multiple Access (TDMA)
  - Modulation: Modified BEAM

Security
- Rockwell JANUS Encryption Chip

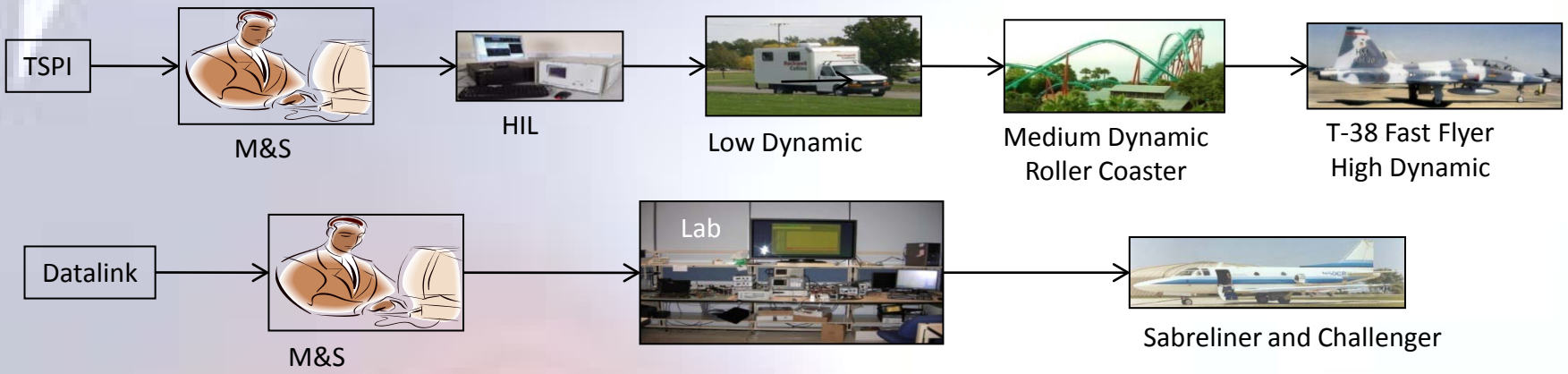
Demonstration
- Independent TSPI and Datalink Testing

TSPI Demo

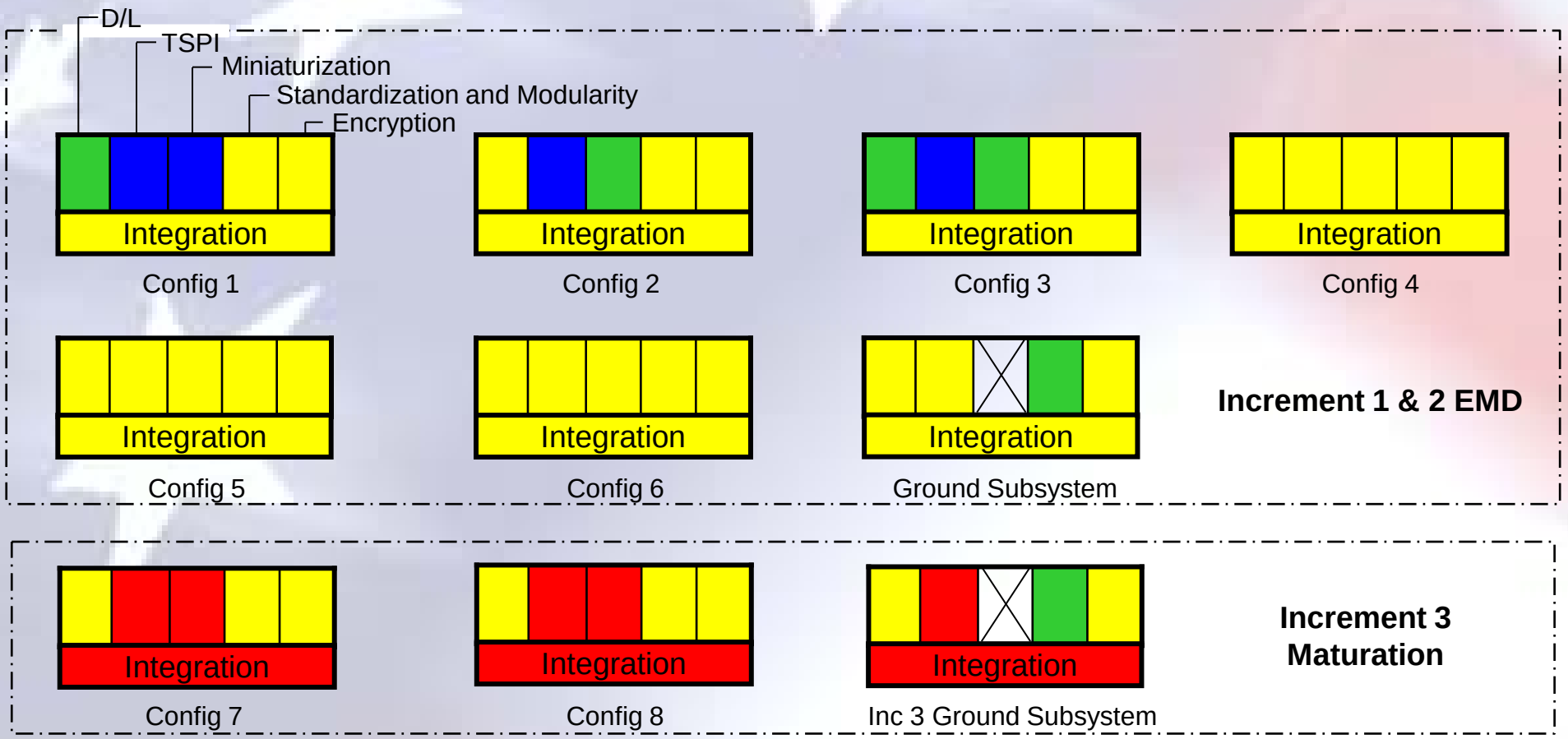
Flight	29 Oct, Flight	Rqmt (m)
Maneuver Type	360 º 5g turn	
RT Horiz Pos Acc (m)	0.1	0.3
RT Vert Pos Acc	0.1	0.3
PM Horiz Pos Accuracy	0.05	0.1
PM Vert Pos Acc	0.1	0.1

Datalink Demo:
- 90% Message Reliability
- 130 nmi Range

Security:
- JANUS Type 1 Encrypt
- Viable MILS Approach

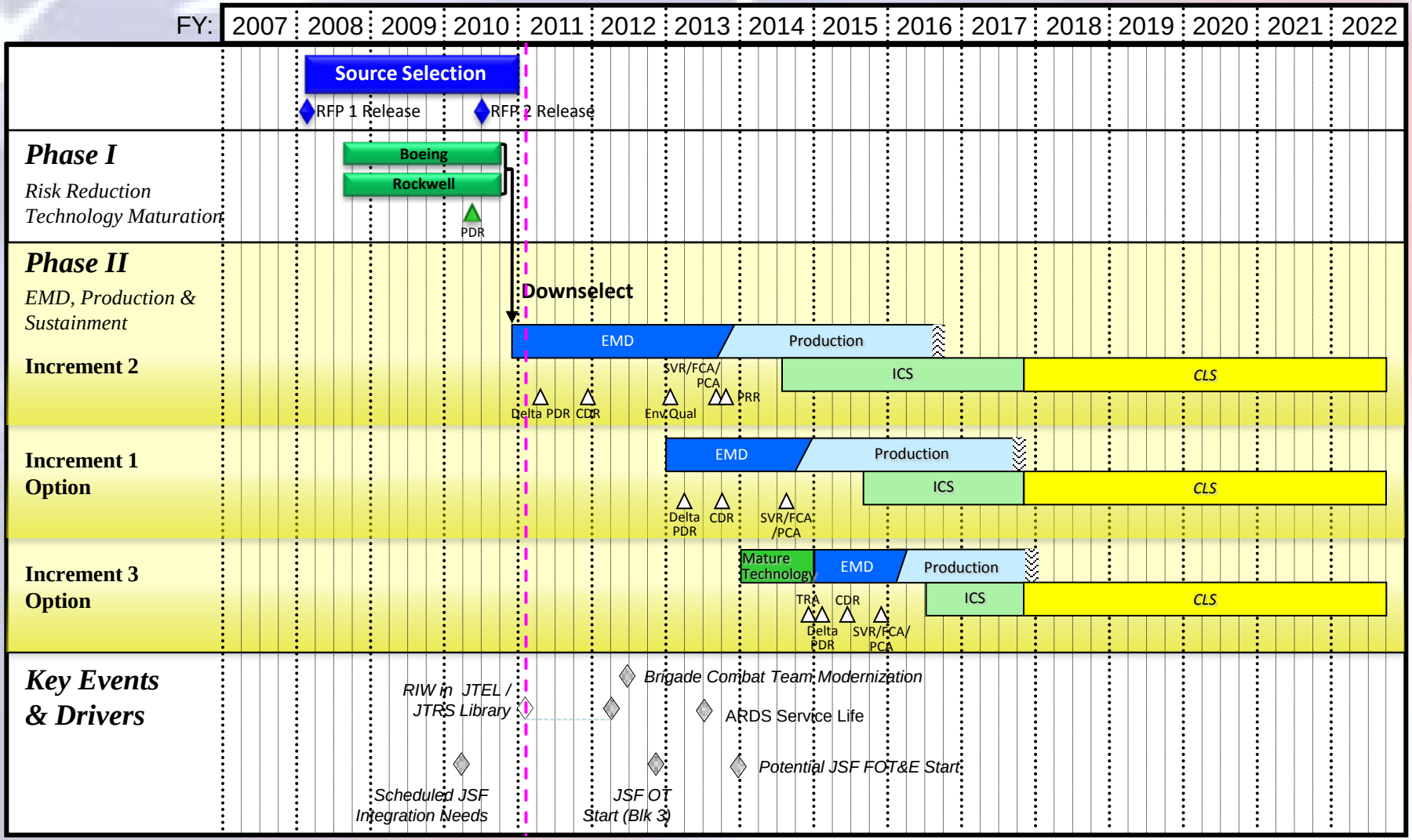


CRIIS TRA Assessment
(Post Risk Reduction)



- TRL = 9 Program Completed
- TRL = 8 Demonstrated on Similar System
- TRL = 6 - 7 Appropriate EMD-Level Integration
- TRL = 1 - 5 Requires Risk Reduction Prior to EMD

CRIIS Phase II Project Schedule



Common Test and Training Instrumentation Still in Play

- **Challenges**
  - Bridging the Community Gap – Great Strides Achieved
  - Bridging the Technical Gap – We Have the 'Know-How'
    - Common Set of Airborne Equipment is Feasible
    - Closure of Ground Infrastructure Gaps are Feasible
  - Quantifying the Efficiencies – We Have to Prove its Worth
- **Time Frame**
  - Leverage CRIIS Development in the Future
    - Preserve Baseline CRIIS Schedule
    - Incorporate Training when Appropriate

The Window is Open

Summary

- CRIIS is Funded and Executing Phase II
- CRIIS Technologies are Leading Edge
  - TSPI Pushing GPS Boundaries
  - Secure High Throughput, High Spectrally Efficient Datalink
- CRIIS is a Future Enabler
  - Conducive to Live, Virtual, Constructive Applications
  - Potential Operational Use
- CRIIS is Taking First Steps in Bringing Test and Training Together