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Defense, Space and Security
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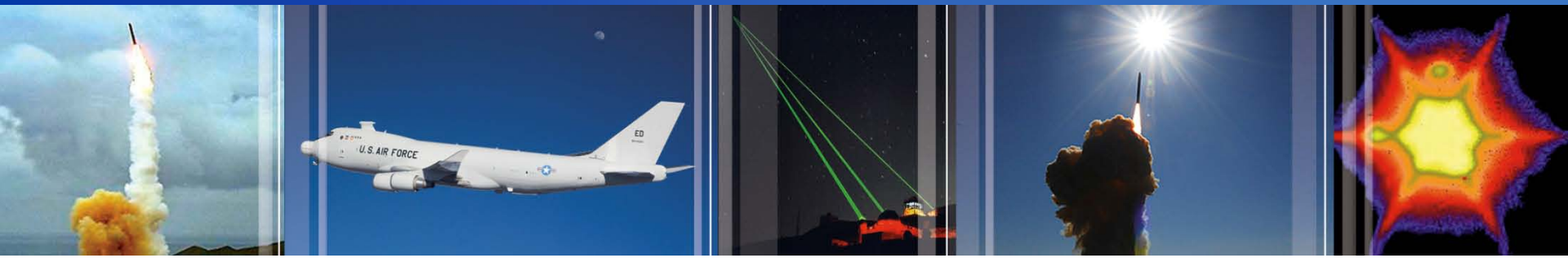

OPTM, A Robust Tool For Process Compliance

National Defense Industrial Association
12th Annual CMMI® Technology Conference & User Group

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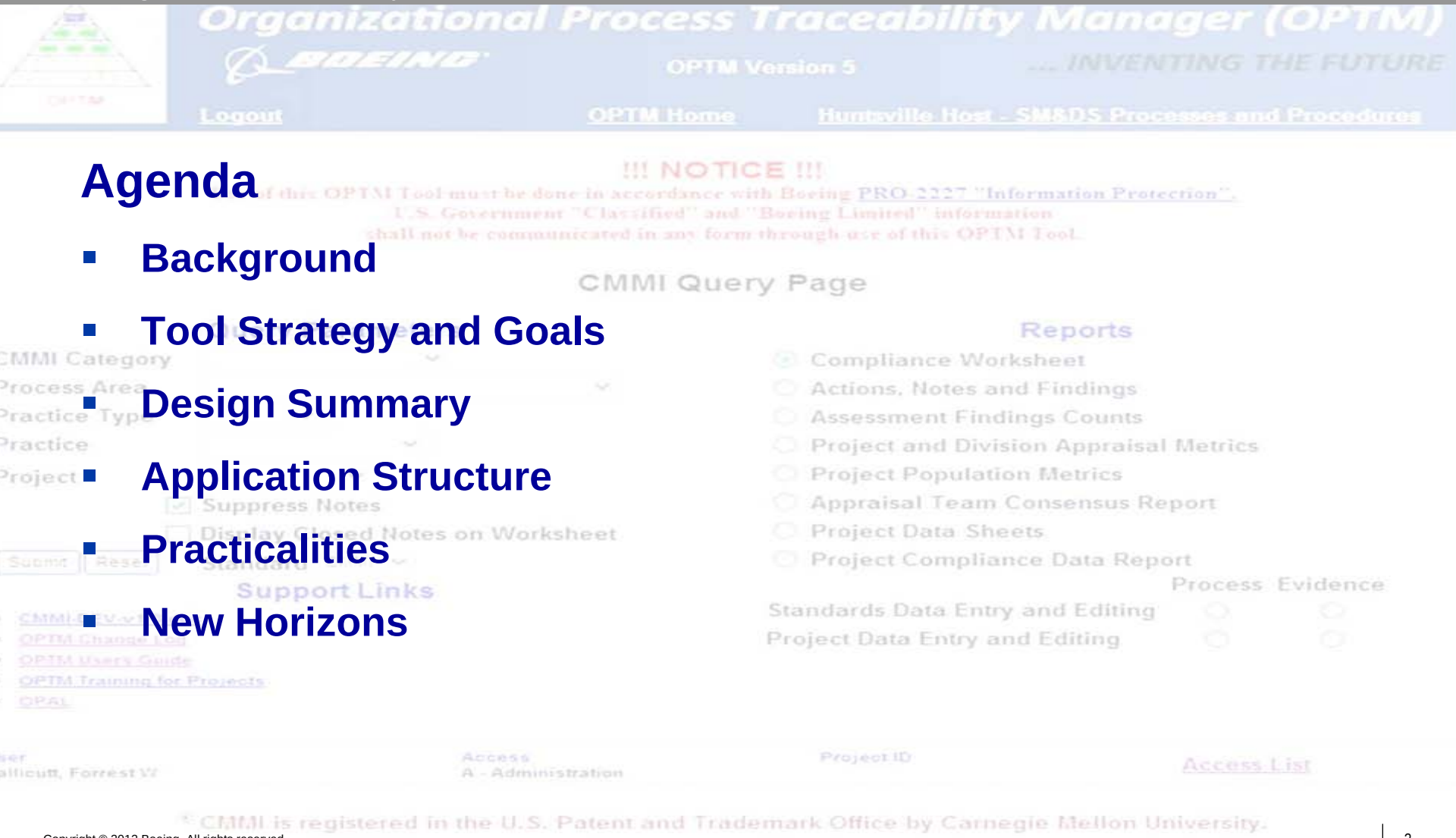
OPTM – A Robust Tool For Process Compliance

Strategic Missile & Defense Systems



Agenda

- Background
- Tool Strategy and Goals
- Design Summary
- Application Structure
- Practicalities
- New Horizons

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Purpose

Since 2003, The Boeing Company, Huntsville, AL, has experienced great success using an in-house database tool for appraisals. The database tool has endured various process initiatives, and many program changes while adapting to the requirements of each appraisal.

The purpose of this presentation is to share the experiences and challenges, both positive and negative, of an appraisal tool entitled Organizational Process Traceability Manager (OPTM).

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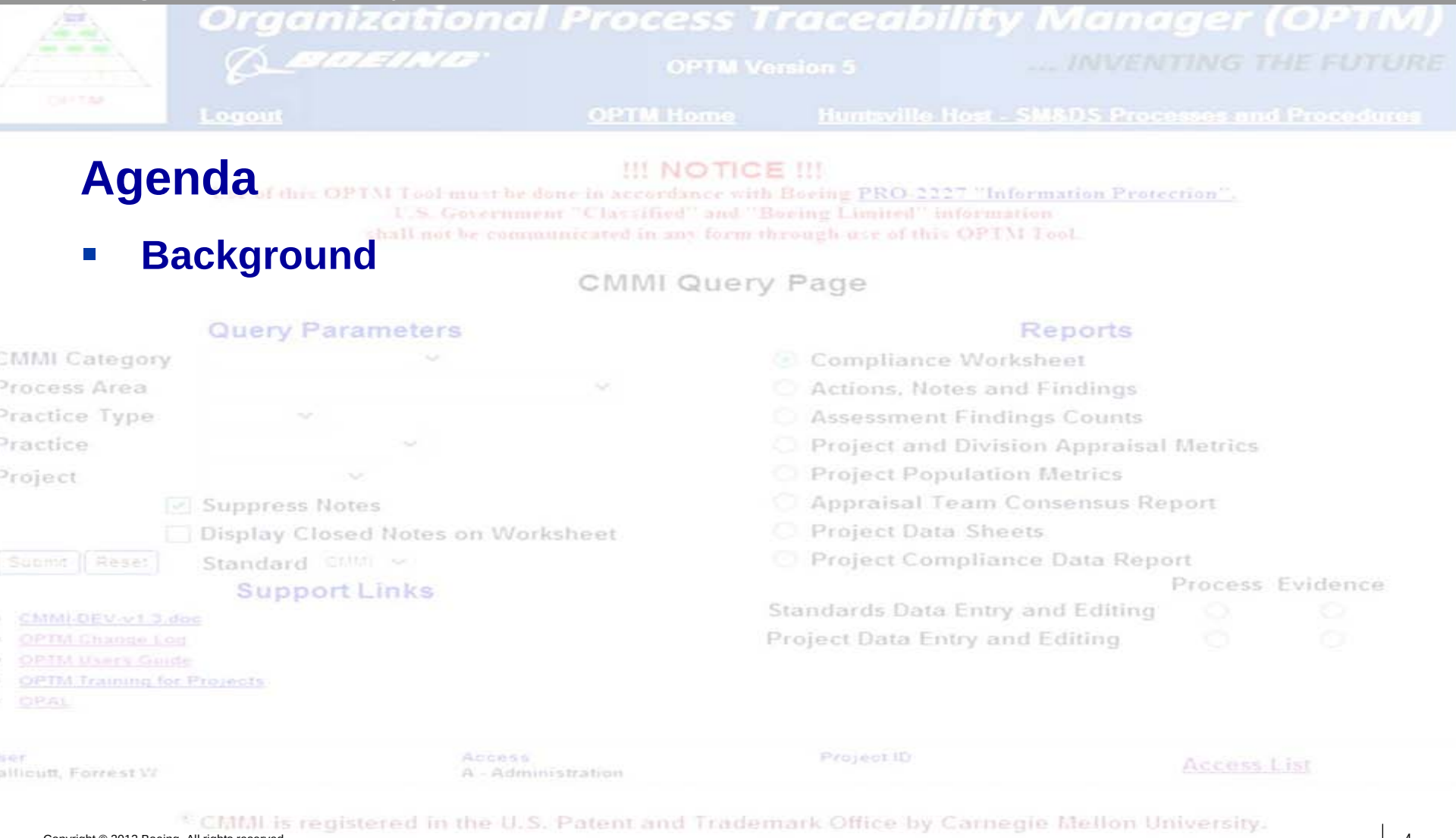
OPTM – A Robust Tool For Process Compliance



Agenda

- **Background**

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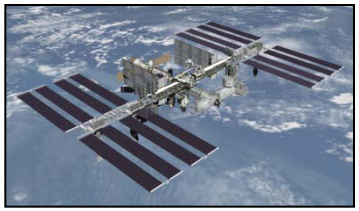
50 years of Boeing in Alabama

Strategic Missile & Defense Systems

A Legacy of Performance

- Saturn V (1962)
- Lunar Rover (1970)
- Military Simulation and Training(1980)
- Avenger (1985)
- Space Station (1987)
- GMD (1998)
- Huntsville Design Center (2004)
- Space Launch System (2011)



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Continuous Process Improvement is a Hallmark of Boeing Huntsville

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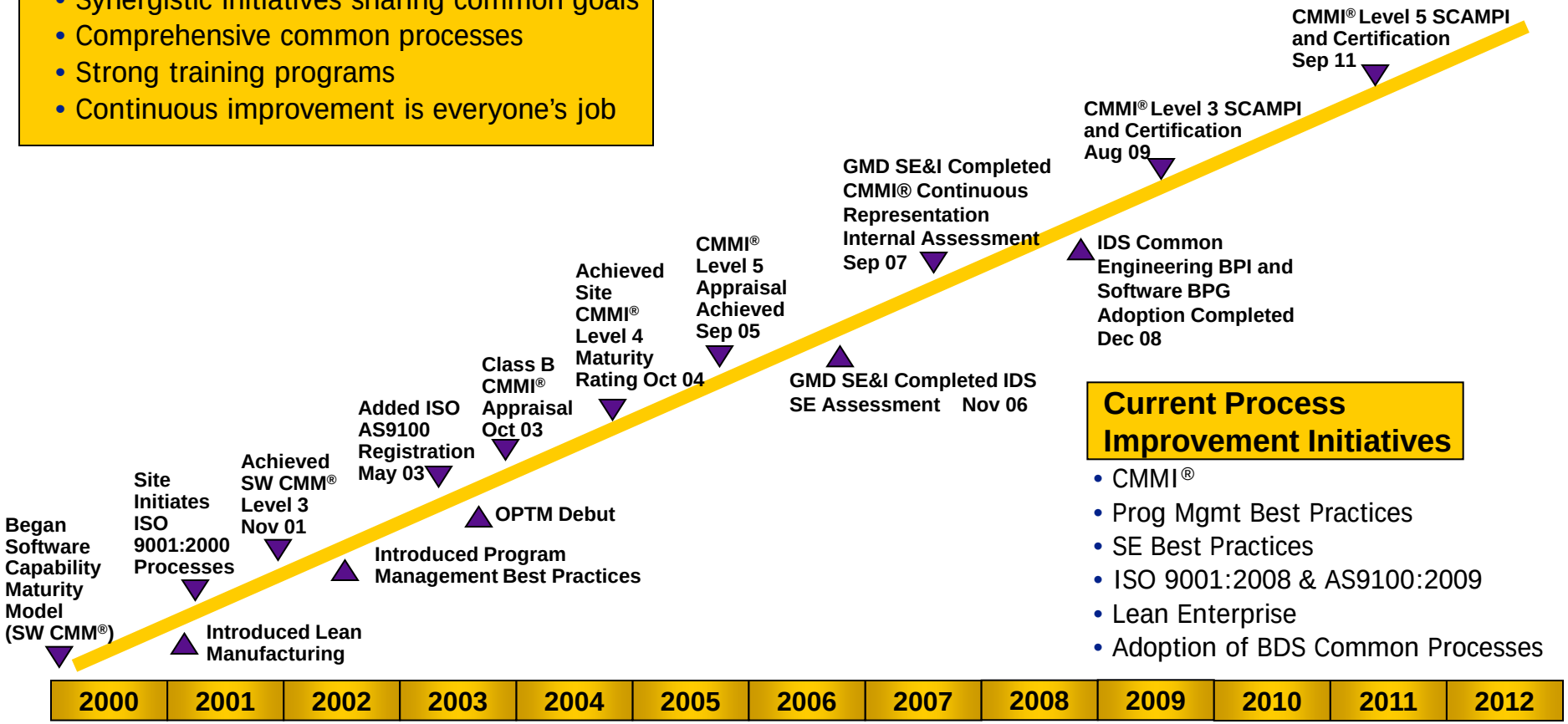
- Aggressive adoption & deployment
- Synergistic initiatives sharing common goals
- Comprehensive common processes
- Strong training programs
- Continuous improvement is everyone's job



Current Process Improvement Initiatives

- CMMI®
- Prog Mgmt Best Practices
- SE Best Practices
- ISO 9001:2008 & AS9100:2009
- Lean Enterprise
- Adoption of BDS Common Processes

Boeing / SM&DS Committed to Process Discipline and Excellence!

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OPTM – A Robust Tool For Process Compliance

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Agenda

- **Tool Strategy and Goals**

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OPTM – Strategy and Goals

Tool Strategy

- Map Industry Standards (e.g. CMMI) to Boeing Enterprise Common Processes, and in turn to Project Specific Processes

Tool Goal

- Provide means for Project to demonstrate satisfaction of approved Company Practices, and at the same time Industry Standards
- OPTM: primary intent of this approach is to reduce the cost and complexity of meeting external standards that are important to Boeing as strategic and sometimes contractual guidance

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OPTM – Strategy and Goals

- **A view of Process to Standards Mapping**

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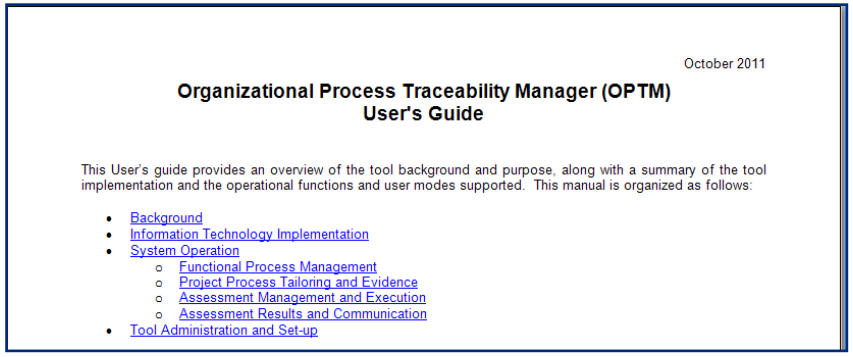
Additional Drivers

SM&DS Site Drivers

- Single access portal for appraisal lifecycle
  - Exception: classified content
- Support simultaneous, multi-user, multi-purpose activities
- Quick response times for viewing access
- Roles clearly defined and enforced
- Configuration management of data

Individual Project Drivers

- Access to pertinent areas
- Protection of Project Data
- Ease of use



October 2011

Organizational Process Traceability Manager (OPTM)
User's Guide

This User's guide provides an overview of the tool background and purpose, along with a summary of the tool implementation and the operational functions and user modes supported. This manual is organized as follows:

- Background
- Information Technology Implementation
- System Operation
  - Functional Process Management
  - Project Process Tailoring and Evidence
  - Assessment Management and Execution
  - Assessment Results and Communication
- Tool Administration and Set-up

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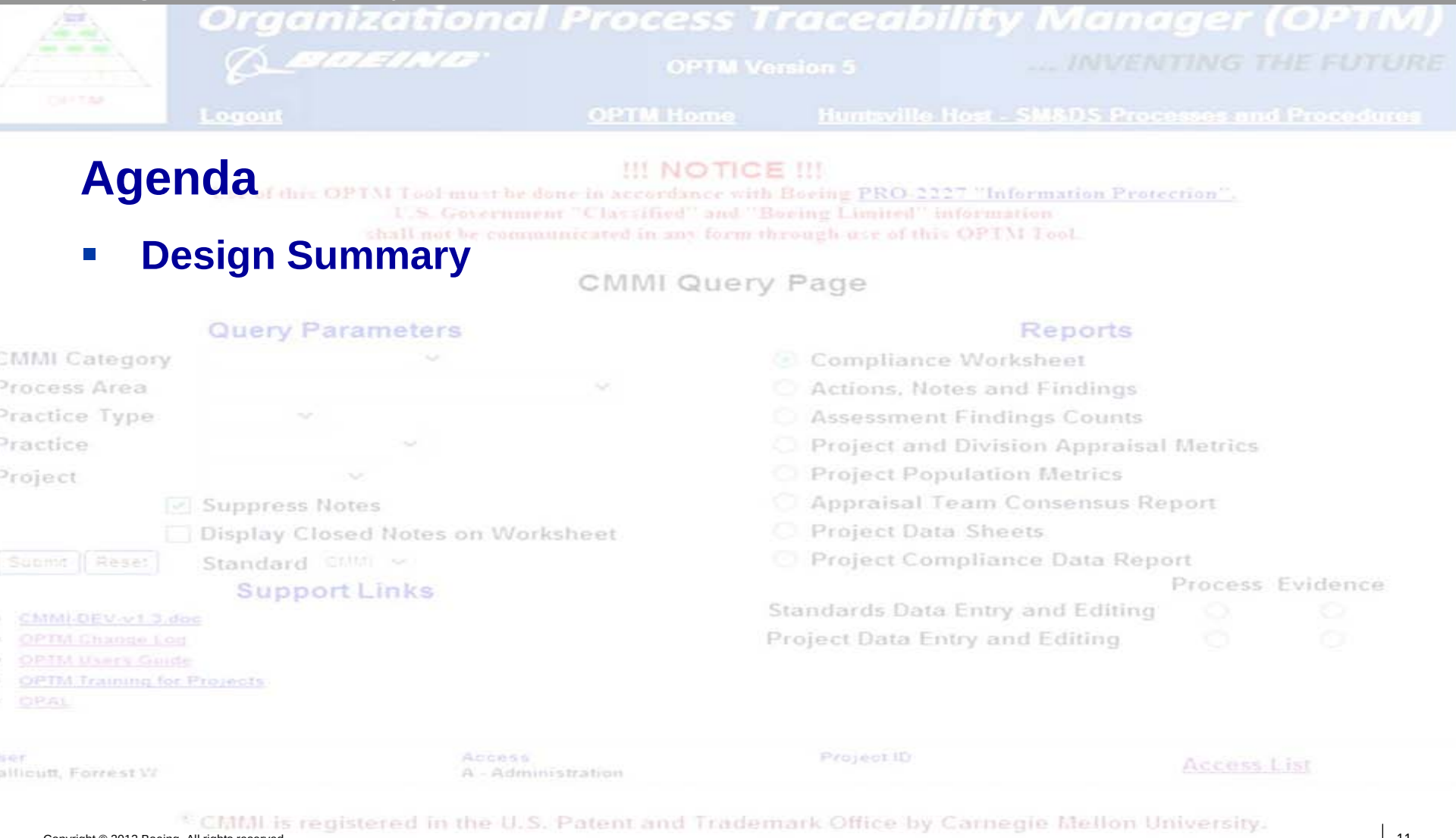
OPTM – A Robust Tool For Process Compliance



Agenda

- **Design Summary**

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OPTM – Implementation Design

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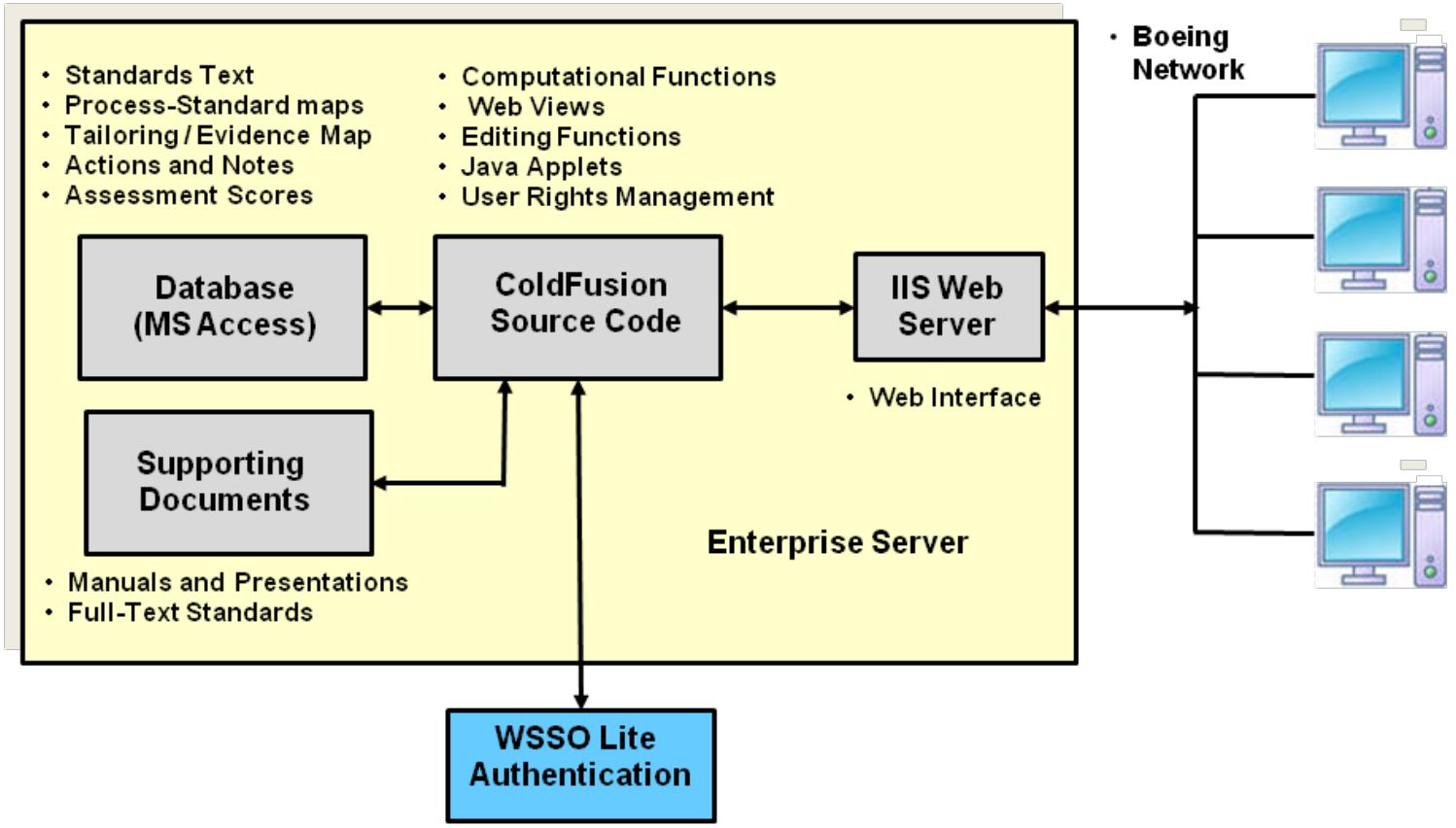

A simple, effective implementation within our Enterprise environment

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Architecture Rationale

- **Web-based architecture**
  - Always accessible across the local and enterprise network
  - Allows effective engagement of multiple users and roles at the same time
  - Allows the use of enterprise user authentication via Web Single Sign-On
  - Simplifies the configuration control of the software as well as the ability to easily and quickly deploy changes to all users simultaneously
- **IIS was selected as the web service since this is an enterprise standard and is resident on all Boeing Web servers**
- **ColdFusion was selected for server-side processing. Boeing maintains enterprise licenses and this has been effectively used for many enterprise tools**
- **MS Access is used to support the database functions.**
  - MS Access has recognized limitations when used in a high traffic multi-user environment; however the simplicity of MS Access greatly facilitates the development process.
  - The tool uses the database primarily for “table-space” to store the information used for the server-side processing and Standard Query Language (SQL) queries

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Database Schema

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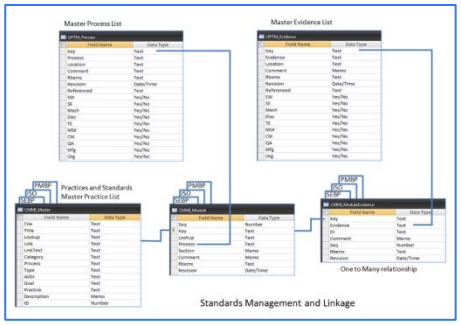
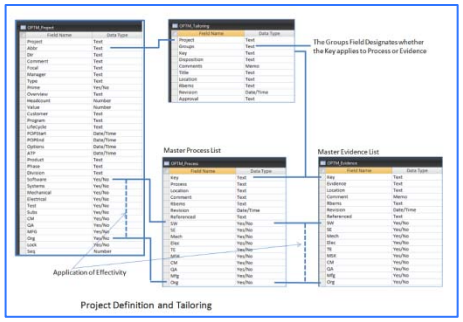


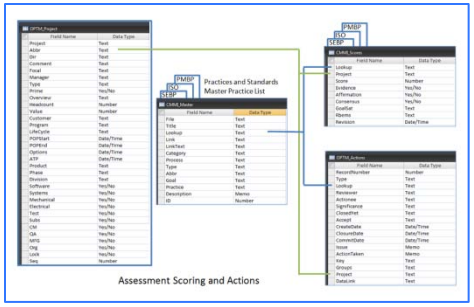
Standards Management and Linkage

- Relates Standards to specific Boeing Processes throughout the model



Project Definition and Tailoring

- Deployment of Company Standards by each Project are documented



Assessment Scoring and Actions

- Evaluations of each process area roll up to a consolidated view

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Primary Functions and Roles

- **Primary Functions**
  - Site Functional Process Management
  - Project Process Tailoring and Evidence Gathering
  - Assessment Management and Execution

- **Roles**
  - Administrator
  - Site/Standard Process Focal
  - Project Process Focal
  - Appraisal Team Lead
  - Appraisal Team Member

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OPTM – A Robust Tool For Process Compliance

Strategic Missile & Defense Systems

Agenda

- **Application Structure**

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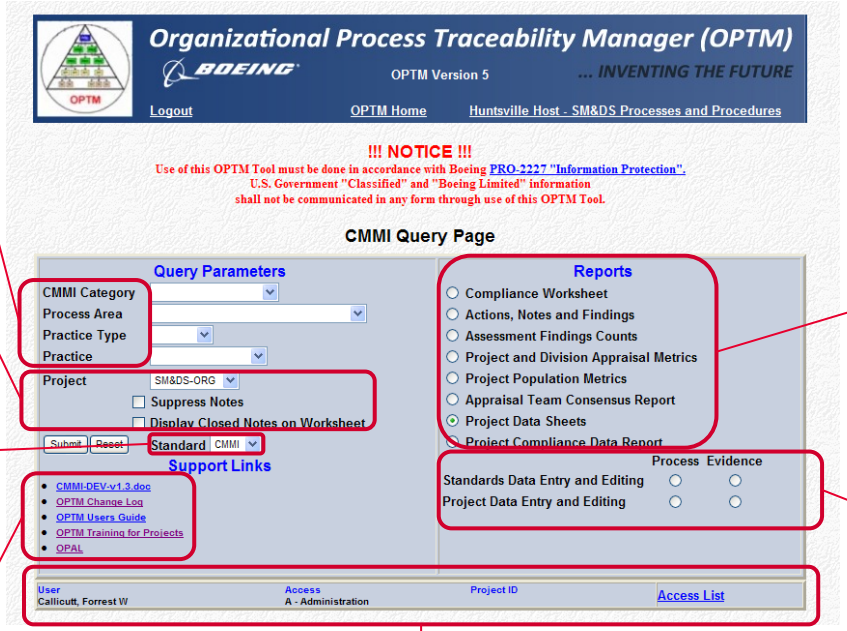
Home—Query Page, the Starting Point

Select Process Area Focus

View Individual Project and Notes

Move between different Standards

Supplemental Information



Reports for all users

Define Process Model and Project Deployment

User Information

A “Submit” button on the left center of the Query page will take the user to the destination selected on the Right, with the parameters selected on the Left

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Access Permissions

Access Permissions Supported

- Administration – Provides ability to access and manage all tool functions
- CMMI Approval – Provides functional rights to approve project tailoring and evidence
- Note – Can view and edit findings and notes
- Project Write – Provides the ability to edit project information. The specific projects are selected via a drop down menu
- Read Only – Can see the process/evidence information in the tool but cannot make changes
- Scores Read Only – Can see the scoring but cannot make changes
- Scores Write – Can update and record scores

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Aligning Company Processes to Model

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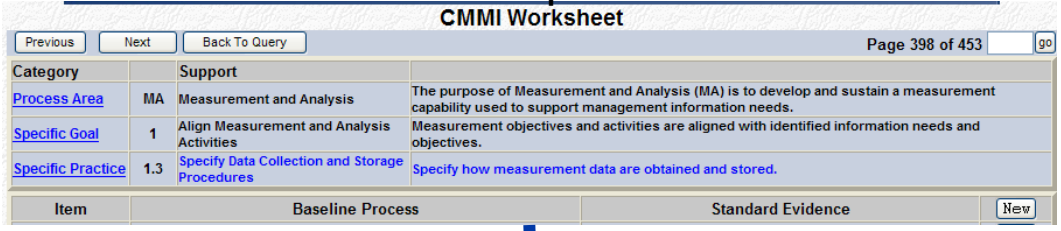
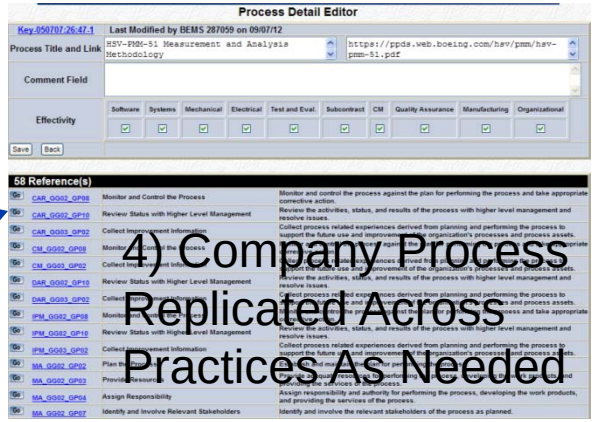
1) CMMI Process Model Captured for each Practice

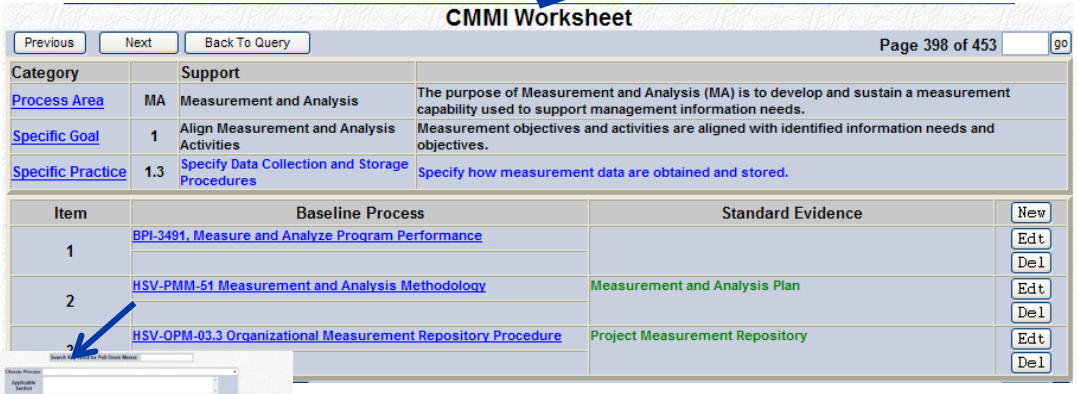


2) Company Processes Added to Form Process Baseline

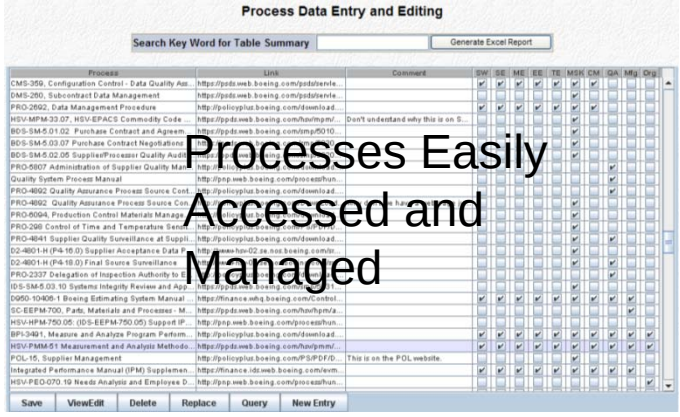
3) Company Process Info Entered



4) Company Process Replicated Across Practices As Needed



2a) Add New Process



Processes Easily Accessed and Managed

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Building a Project Instance

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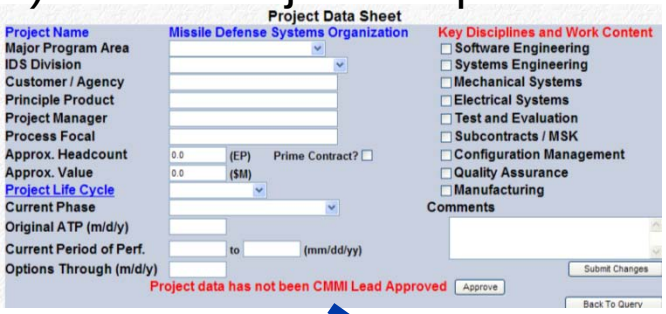
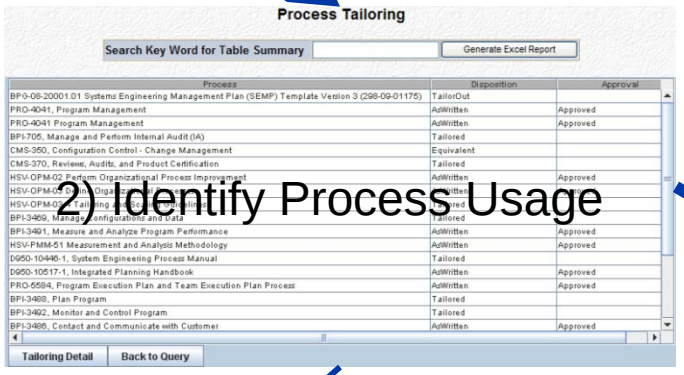
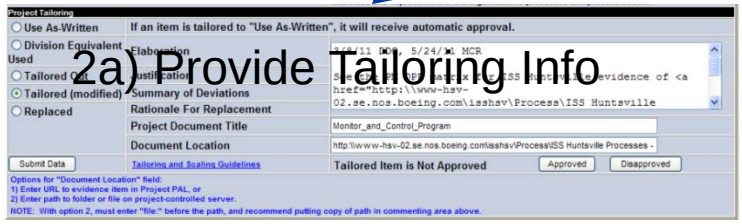
1) Define Project Scope



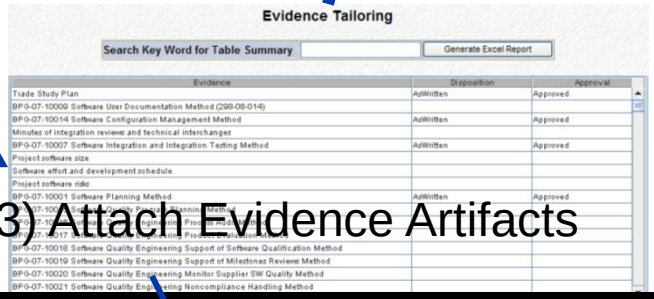
2) Identify Process Usage



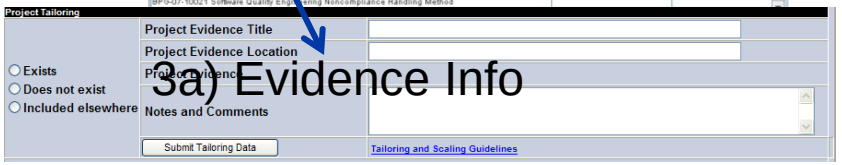
2a) Provide Tailoring Info



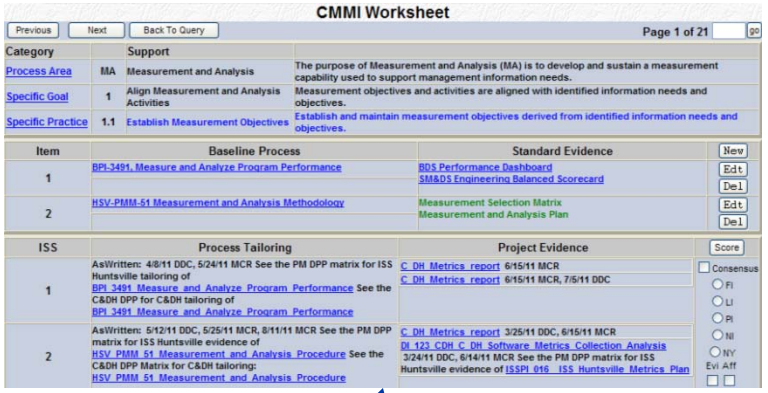
3) Attach Evidence Artifacts



3a) Evidence Info



4) Project data tied to each Process Area



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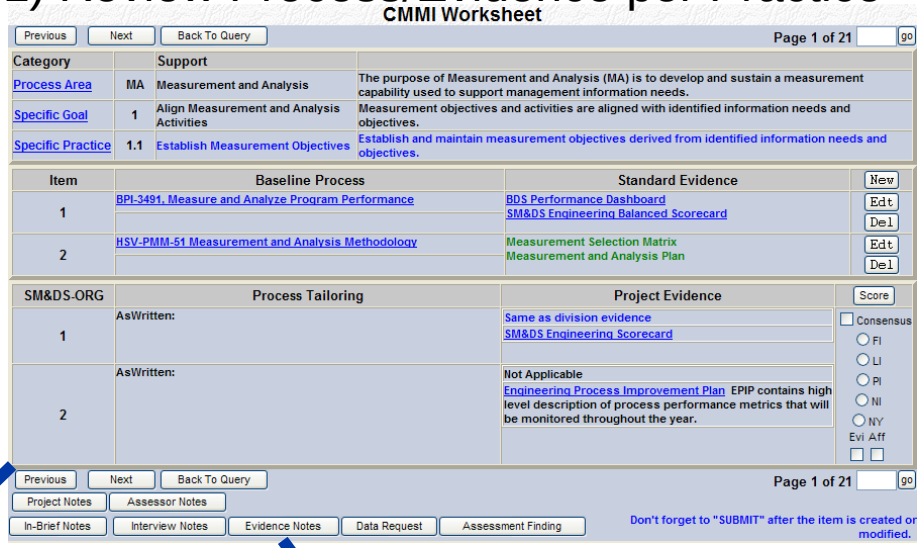
Appraisal Readiness Review Support

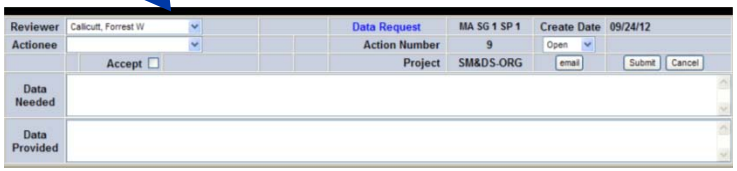
Readiness Review

- Partition work into Mini-Teams
- Fast Pass, check links only
  - Write Data Request Notes
- Evaluate Evidence sufficiency
  - Write Data Request Notes
  - Create Evidence Notes
- In Briefs
  - Create In Brief Notes

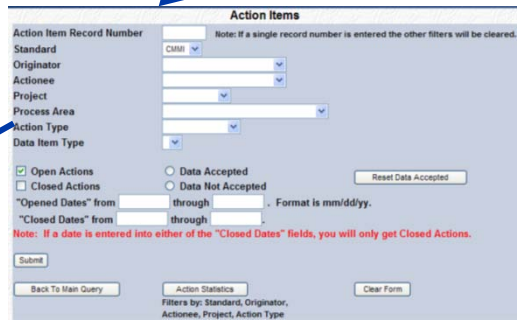
1) Review Process/Evidence per Practice



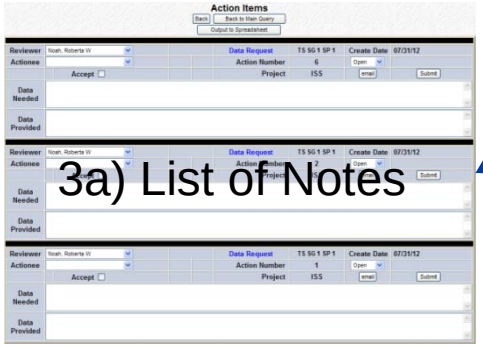
2) Write Note



3) Query Notes Status



3a) List of Notes



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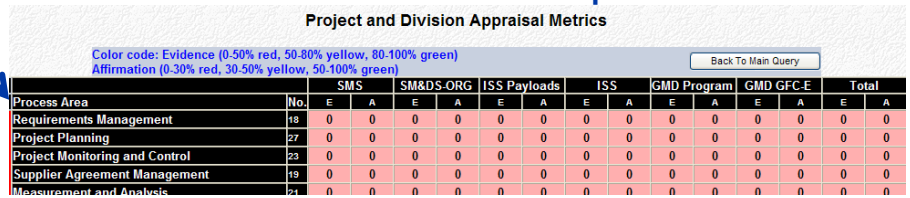
Appraisal SCAMPI Reporting

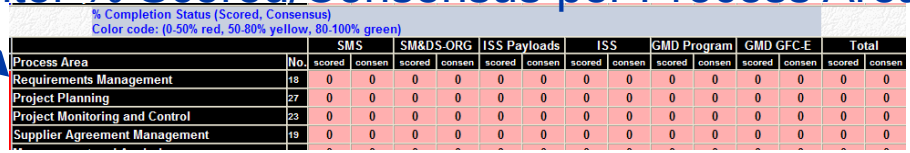
Conduct SCAMPI A

- Interviews
  - Create Interview Notes
- Evaluate Evidence
  - Write Data Request Notes
  - Create Evidence Notes
- Mini-Team Evaluation
  - Create Assessor or Finding Notes
  - Develop Characterization
- Full Team Evaluation
  - Create Assessor or Finding Notes
  - Develop Consensus
  - Determine Goal Satisfaction, then Process Area Satisfaction
  - Maturity Level Result

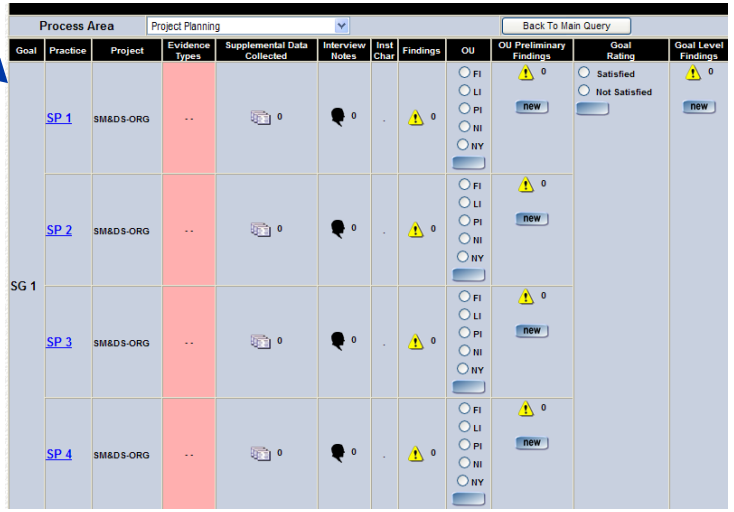
Monitor % Evidence/Affirmation per Process Area



Monitor % Scored/Consensus per Process Area



Monitor Characterization/Satisfaction per Process Area



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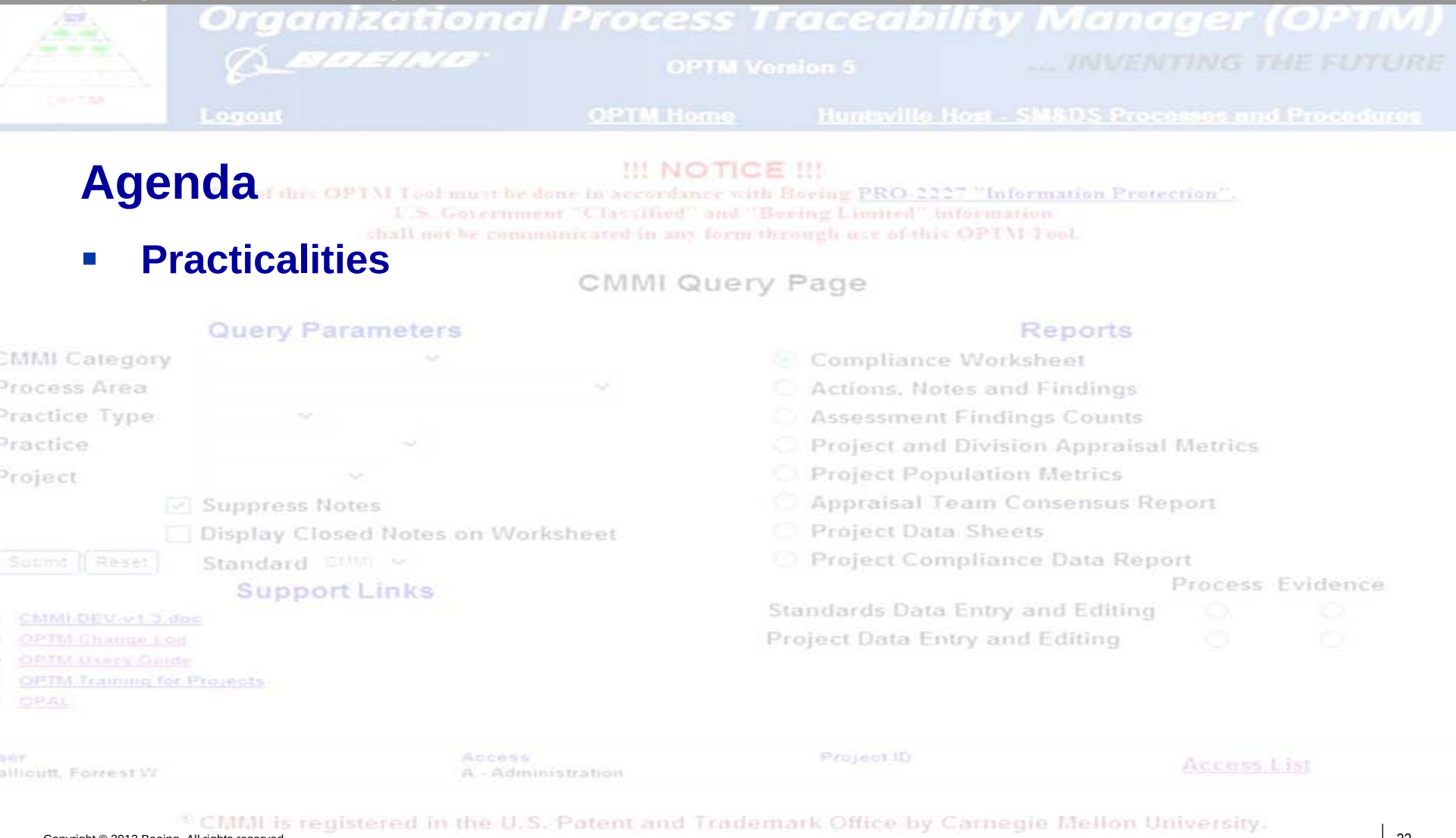
OPTM – A Robust Tool For Process Compliance



Agenda

- **Practicalities**

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Project View of OPTM – GMD Program

- **SCAMPI Preparation**
  - 130 Processes identified – 91.5% As Written (Enterprise Standard)
  - 311 Evidence Items identified – 98% As Written
  - Project Process Focal
    - Controls effort for initial project, and for subsequent appraisals
    - Decides who has write access
    - Involved with input of all artifacts
      - Retains knowledge of what is in tool in every process area
      - Benefits answering data request
    - Project Subject Matter Experts (SMEs) input artifacts
      - when interviewed they have knowledge of how artifacts correlate with practice
  - OPTM provides quick access to reference material (CMMI Model, Boeing Enterprise Processes) as projects input related artifacts
  - Maintenance of Project data between Appraisals
    - As the site common processes are updated, the process focal reviews the changes for possible impacts and obtains assistance when needed from the functional area representatives to update tailoring

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Project View of OPTM – GMD Program

- **SCAMPI Conduct**
  - Data Requests routed to Project Process Focal
    - Reached out to other project resources to work as needed
  - 125 Data Requests Notes recorded at last appraisal

- **Desired Enhancements**
  - Keeping evidence artifacts updated efficiently
    - And identify which artifacts need updating during appraisal preparations
  - Using same tool and artifacts to respond to other audits without the need for additional resources

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Project View of OPTM – ISS Program

- **SCAMPI Preparation**
  - 172 Processes identified
    - 30% As Written (Enterprise Standard)
    - 12% Equivalent Used
    - 51% Tailored
  - 373 Evidence Items identified – 77.7% As Written
  - Project Process Focal
    - Is a senior engineer with a wide range of engineering development experiences
    - Has administrative support for entering and verifying all data
  - Functional Area Representative (SW,HW)
    - Provides process specific knowledge and tailoring concerning their area of expertise
    - Verifies processes that have been tailored and project evidence
  - Maintenance of Project data between Appraisals
    - As the site common processes are updated, the process focal reviews the changes for possible impacts

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Project View of OPTM – ISS Program

- **SCAMPI Conduct**
  - Data Requests routed to Project Process Focal
    - Easy to determine data requests content and provide information back to the appraisers
  - 115 Data Requests Notes recorded at last appraisal

- **Desired Enhancements**
  - For maintenance in between appraisals, there isn't a view/screen which allows the engineer to see the applicable site common processes and corresponding program's tailoring
  - Data Request acceptance is not clear, requires monitoring to see if it closes or if additional information is needed
  - Not an easy way to revalidate past entries from other audits (copy and paste into new project image or keep a paper tally of which process areas have been re-verified)

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Site Engineering Function View of OPTM

- **Maintaining Standards and Enterprise Process Consistency**
  - Completeness – Ability to determine
  - Replicating across multiple Practices – Be Careful
  - Peer Review if significant changes occur
- **Managing Preparations for Appraisal**
  - Adding Projects – Easy and Straightforward
  - Reuse of Previous Project Mappings is a great starting point
  - Review and Approve any non-“As Written” Project process
  - Reports provide overall status of populating tool with evidence
- **Execution of Readiness Review – thru Appraisal**
  - Single Site Focal for Appraisal Team
  - Data Request Notes are primary means of Communication
  - Configuration Management challenges
- **Desired Enhancements**
  - Need better lifecycle management of Data Requests
  - Overall reports in tool are usually supplemented

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Appraisal Team View of OPTM

- **Readiness Review**
  - Fast Pass, check links only
    - When things are set up properly can “fly” through practices
    - Typical Data Requests are for broken link, access denied, missing/incorrect data provided problems
  - Checking Documentation sufficiency
    - Opening Documents can be an issue for particular size, application, and document repository location
    - Some links go directly to relevant content internal to document
    - Typical Data Requests are for wrong or missing document
  - Briefings
    - Notes tie directly to practice area
    - Copy/Paste between practice areas possible but not efficient
  - Desired Enhancements
    - Team approach to OPTM utilization varies
    - Team members still create own status tracking/reporting tools

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Appraisal Team View of OPTM

- **SCAMPI A**
  - Different Note types aid in keeping overall review and evaluation process organized
  - MiniTeam (2) works efficiently by keeping two instances operating: one capturing Notes and Characterization, the other accessing evidence
  - Team members have ready access to all characterization data and progress reports
    - Ability to export to excel report data and do additional analysis

BOEING

Strategic Missile & Defense Systems
Huntsville and Huntsville Hosted
Large Defense and Space Programs

has successfully completed a
Standard CMMI® Appraisal Method for Process Improvement (SCAMPI)℠ Appraisal
conducted by

AMERICAN SYSTEMS

on

September 30, 2011

and was judged to be at

CMMI Maturity Level 5

as defined by CMMI-DEV & SCAMPI version 1.3

SEIPartner

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David Greer
SEI Certified Lead Appraiser
#0300276-01

  - Desired Enhancements
    - Further refinement of note and reporting capabilities for disciplines (e.g. Systems Engineering, Software, Hardware)
    - Need to accommodate different types of CM strategies for the different types of notes

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OPTM – A Robust Tool For Process Compliance

Agenda

- **New Horizons**

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OPTM – New Horizons

- **Via a Boeing Lean+ 10X initiative in Puget Sound the tool continues to be expanded to Four Standard Views**
  - CMMI (Version 1.3 for Development)
  - ISO (AS9100C)
  - Systems Engineering Best Practice (SEBP Version 5.2)
  - Program Management Best Practice (PMBP 2010)
- **Transition to enterprise standard database (either Oracle or SQL Server)**
- **Enhancements identified during usage are implemented as budget and schedule allow**
  - Improving Project Interfaces
  - Keeping evidence up-to-date
  - Better Readiness Review and Discipline (SE,SW,HW) Support

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OPTM Conclusion

- **OPTM's original design grew from a practical understanding of the overall appraisal experience**
- **It has achieved the "right" level of functionality and sustainability to support our CMM/CMMI activities for the past 10 years**
  - Through CMM/CMMI Model Improvements
  - Transitioning from site specific process to enterprise processes
  - Supporting the changing business climate
- **Due to its robustness and continued expansion it will continue to be our tool of choice for future appraisals and audits**

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