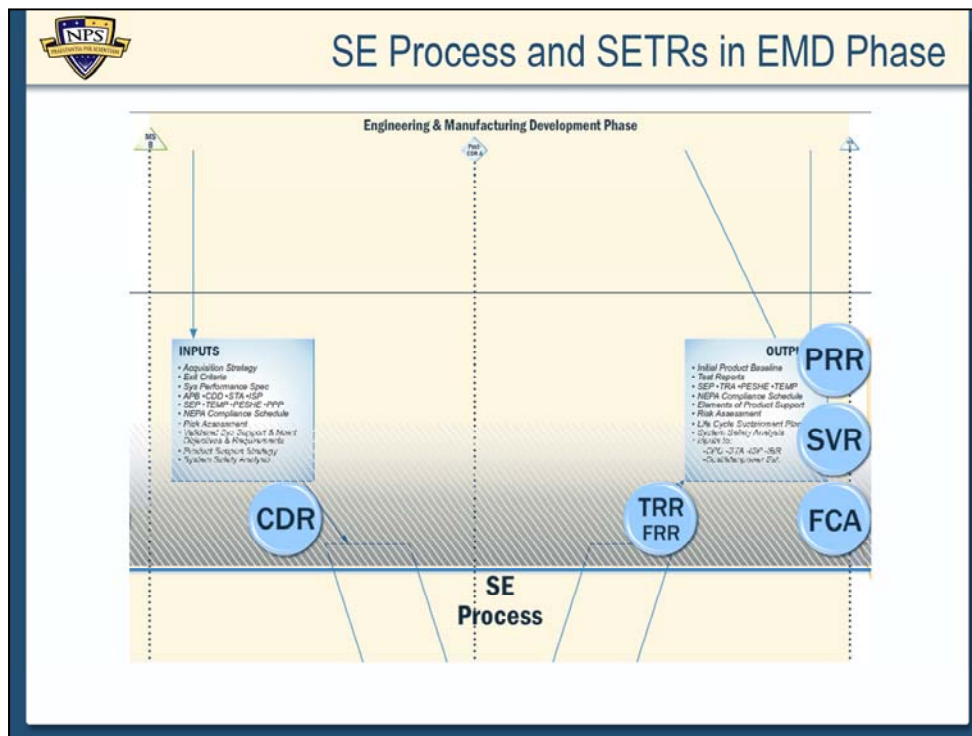




Technical
Systems Engineering Process
Test Readiness Review
System Verification Review
Functional Configuration Audit
Production Readiness Review

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There are a number of Systems Engineering Technical Review activities that happen in the SE Process 'V' in the Engineering and Manufacturing Development phase. They're shown in this slide. We covered the Critical Design Review (or CDR) in Module 8. The Test Readiness Review, Production Readiness Review, System Verification Review, and Functional Configuration Audit will be covered in this Module.



SE Process in EMD Phase

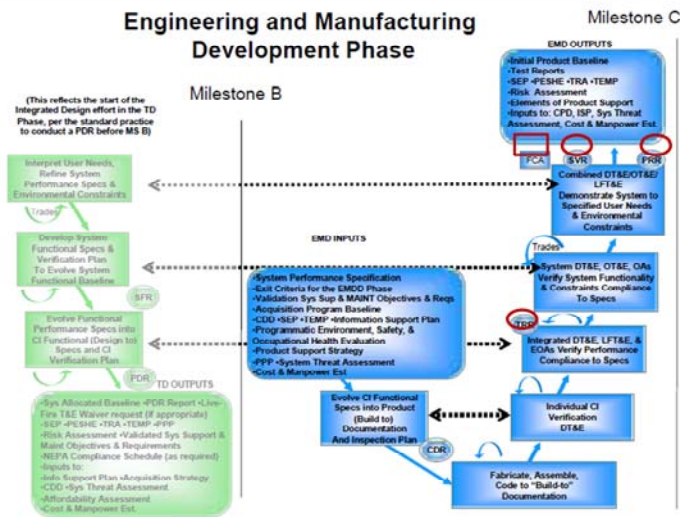
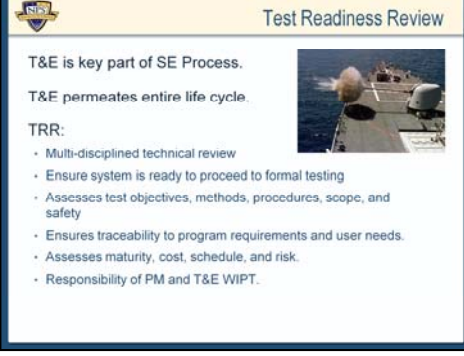


Figure 4.3.3.3.F1. Systems engineering-related steps during the System Design effort of Engineering and Manufacturing Development

The screen shot on this slide is from the DAG. It should look familiar to you. You just saw it in Module 8! It's shown again here so that you can put the four technical review activities in context with the other things that happen in the SE Process in the Engineering and Manufacturing Development phase.

A slide titled "Test Readiness Review" with a yellow header and a blue border. It contains text and a small image of a satellite in space.


Test Readiness Review

T&E is key part of SE Process.

T&E permeates entire life cycle.

TRR:

- Multi-disciplined technical review
- Ensure system is ready to proceed to formal testing
- Assesses test objectives, methods, procedures, scope, and safety
- Ensures traceability to program requirements and user needs.
- Assesses maturity, cost, schedule, and risk.
- Responsibility of PM and T&E WIPT.



Test and evaluation is an integral part of the systems engineering processes of verification and validation.

Test and evaluation should permeate the entire life cycle of an acquisition program and is also an important tool to identify and control risk.

The TRR is a multi-disciplined technical review. It's designed to ensure that the system or subsystem is ready to proceed into formal testing.

The TRR assesses test objectives, test methods and procedures, scope of tests, and safety. It also confirms that the required test resources have been identified and coordinated to support the tests.


The TRR ensures that the planned tests are traceable to both program requirements and user needs.

It determines the completeness of test procedures and their compliance with test plans and descriptions.


The TRR also assesses the system for development maturity, cost and schedule effectiveness, and risk. After the TRR is completed, the results should be made available to those involved in either managing or conducting the testing.

The TRR should be tailored to the specific acquisition phase, the specific planned tests, and the level of risk in the program. The tailoring is usually accomplished by the Program Manager and the Test and Evaluation Working-Level Integrated Product Team (or T&E WIPT).

The Program Manager and the T&E WIPT are responsible for determining that sufficient progress has been made in preliminary, functional, and pre-qualification testing. If they feel that enough progress has been made, they proceed with a Test Readiness review, followed by a formal, system-level test.

 Test Readiness Review

- Test plans completed and approved.
- Test resources identified.
- Prior results sufficient to proceed.
- Level of risk acceptable.



The Test Readiness Review will be successful if the four things listed on this slide happen.

The system's test plans have been completed and have been approved.

All of the resources that will be needed for testing have been identified. And, all the necessary coordination has been done to ensure they'll be available when they're needed.

The Program Manager and the T&E WIPT have determined that the previous component, subsystem, and system test results have been successful enough to warrant moving on to the formal system-level testing.

And, the Program Manager has reviewed the program risk and has decided that the risk level is acceptable.

DoD has developed a Test Readiness Review Risk Assessment Checklist in the form of an Excel Spreadsheet. It's attached to the block on the Interactive DA Framework where you found this presentation. It's another useful tool that I think you'll want to download and save. The checklist even has a few items that address HSI!



Flight Readiness Review

FRR a sub-set of TRR.

Only for aviation programs.

Assesses readiness of program to begin flight tests.

Requires:

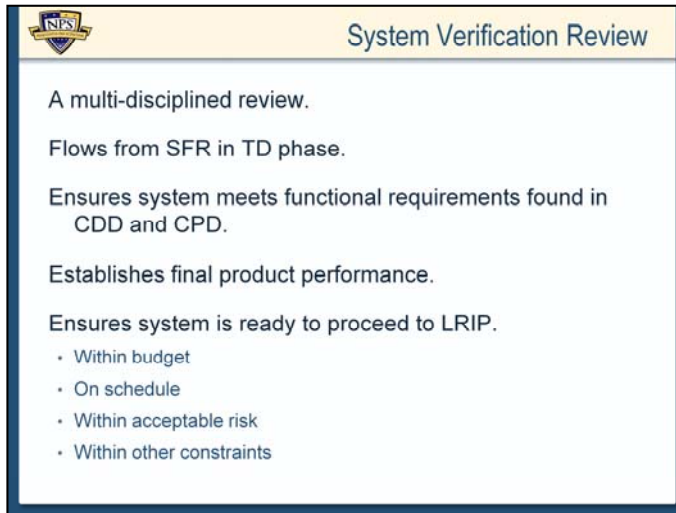
- Flight clearance
- Approved test plans
- Ability to track discrepancies
- Ability to track program risk



The Flight Readiness Review is a sub-set of the Test Readiness Review. As you might expect, it's only applicable to aviation programs.

The purpose of the FRR is to assess the readiness of a program to begin flight tests or flight operations.

Usually, FRR approval requires the aviation system to be under configuration management. Also, flight clearance has to be issued by the technical authority, the flight test plans have to be approved, and procedures for tracking discrepancies and risk assessment have to be in place.

A slide titled "System Verification Review" with a logo in the top left corner. The slide contains a list of bullet points describing the review process.

System Verification Review

- A multi-disciplined review.
- Flows from SFR in TD phase.
- Ensures system meets functional requirements found in CDD and CPD.
- Establishes final product performance.
- Ensures system is ready to proceed to LRIP.
 - Within budget
 - On schedule
 - Within acceptable risk
 - Within other constraints

The System Verification Review is a multi-disciplined product and process assessment.

The SVR is linked closely with the System Functional Review that was conducted in the Technology Development phase.

It assesses the system functionality and determines if the system meets the functional requirements described in the Capability Development Document and draft Capability Production Document.

The SVR also establishes and verifies final product performance. SVR results will feed right into the Capability Production Document.

In many systems, the SVR is conducted at the same time as the Production Readiness Review.

The SVR ensures the system can proceed into Low-Rate Initial Production and full-rate production within the program's budget and schedule and that it doesn't exceed the level of risk that was determined to be acceptable. It should also abide by any other constraints that may have been identified as important, such as manpower, maintenance, or safety.



System Verification Review

- Does status of the technical effort and system indicate operational test success?
- Can the system satisfy CDD and draft CPD?
- Are adequate processes and metrics in place for program to succeed?
- Are the risks known and manageable?
- Is program schedule executable within cost and technical risks?
- Are system requirements understood to level appropriate?
- Is program properly staffed?
- Is program's engineering requirement executable with existing budget?
- Is system producible within production budget?

Here are the criteria that will help you determine if the System Verification Review has been successful.

DoD also has a System Verification Review Program Risk Assessment Checklist. It's attached to the block on the Interactive DA Framework where you found this presentation. It's another useful tool that I think you'll want to download and save. And this checklist has literally hundreds of references to HSI!



Functional Configuration Audit

Conducted concurrently with SVR.

Examines characteristics of hardware and software.

Verifies that system complies with requirements in functional baseline.

Verifies system meets SPS.

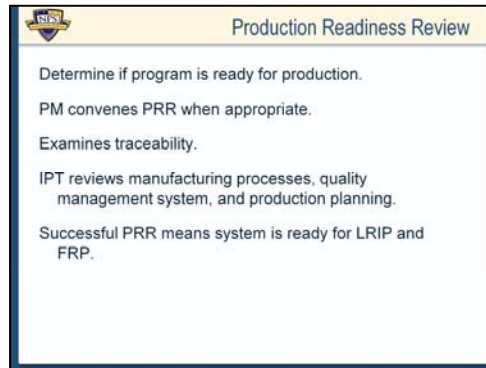
Success is when FCA verifies that system can proceed to LRIP.

A Functional Configuration Audit (or FCA) often is conducted concurrently with the System Verification Review.

The FCA examines the characteristics of the hardware and software in its tested configuration. The objective of this examination is to verify that the actual performance complies with design and interface requirements in the functional baseline. This is obviously something that's important to HSI practitioners. It's one thing to get all of the relevant HSI requirements into the right documents. It's another thing to verify that they have been built into the system and that they've met the requirements in testing environments that are operationally relevant.

Think back to the Technology Development phase when we talked about the System Performance Specification. The FCA is verifying that the system as configured meets the approved System Performance Specification.

An FCA has been successful if it is able to demonstrate that the Engineering and Manufacturing Development phase has produced a product that is mature enough to enter into Low-Rate Initial Production.



The Production Readiness Review (or PRR) examines a program to determine if the design is ready for production.

A big part of this review is determining if the prime contractor and major subcontractors have completed adequate production planning. Their planning should demonstrate that they're not incurring any unacceptable risks with respect to schedule, performance, cost, or other established criteria.

The PRR evaluates the full, production-configured system to determine if it correctly and completely implements all system requirements.

The program manager convenes a PRR of the prime contractor and major subcontractors as appropriate. The PM has the latitude to tailor the PRR to the technical scope and risks associated with the system. PRRs should be conducted iteratively, usually concurrent with other technical reviews, such as the CDR.

The review determines whether traceability is maintained between the final system requirements and the final production system.

The Integrated Product Team should review the readiness of the manufacturing processes, the quality management system, and the production planning. This review should include things like facilities, tooling and test equipment capacity, personnel development and certification, process documentation, inventory management, and supplier management.

The final PRR should occur at the completion of the EMD phase and the start of the Production and Deployment phase.

The PRR is successful if the IPT is able to determine that the system requirements are met in the final production configuration, and that production capability is ready to begin Low-Rate Initial Production (LRIP) and Full-rate production.

There's also a DoD Program Risk Assessment Checklist for the Production Readiness Review. It's attached to the block on the Interactive DA Framework where you found this presentation. It's a good reference for HSI practitioners, although this checklist doesn't have anywhere near the number of references to HSI compared to the SVR checklist.