Test & Evaluation Products for Systems Engineering Reviews

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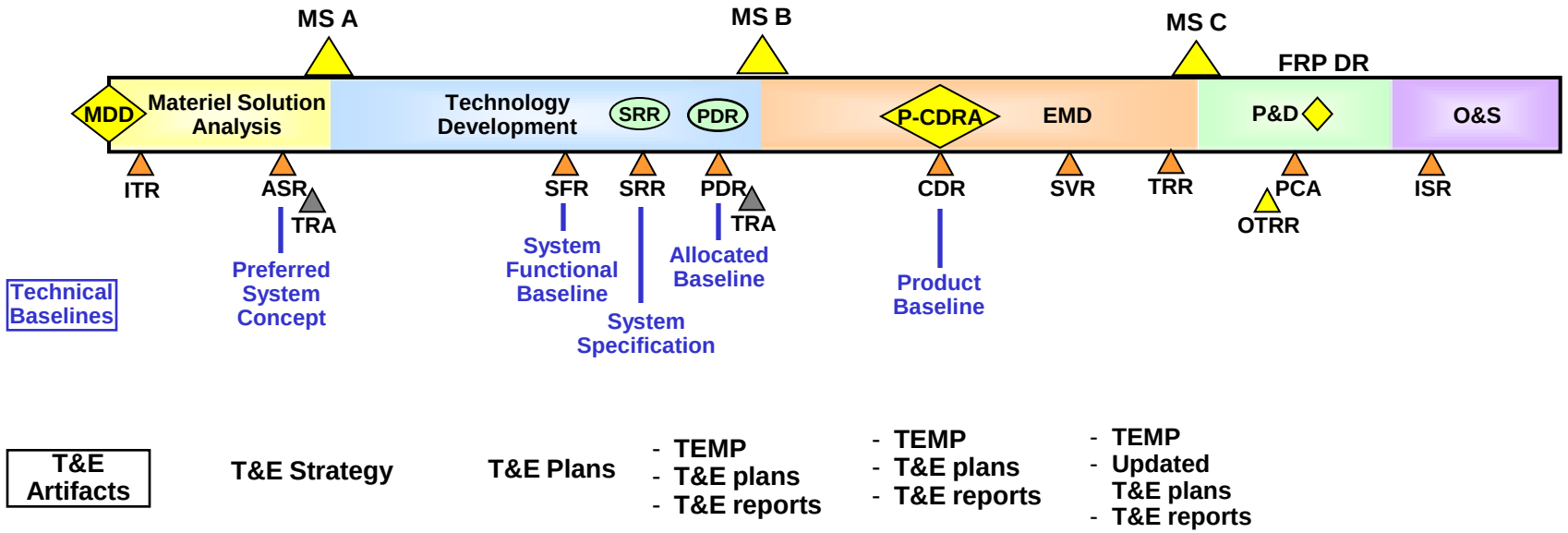
Purpose of T&E

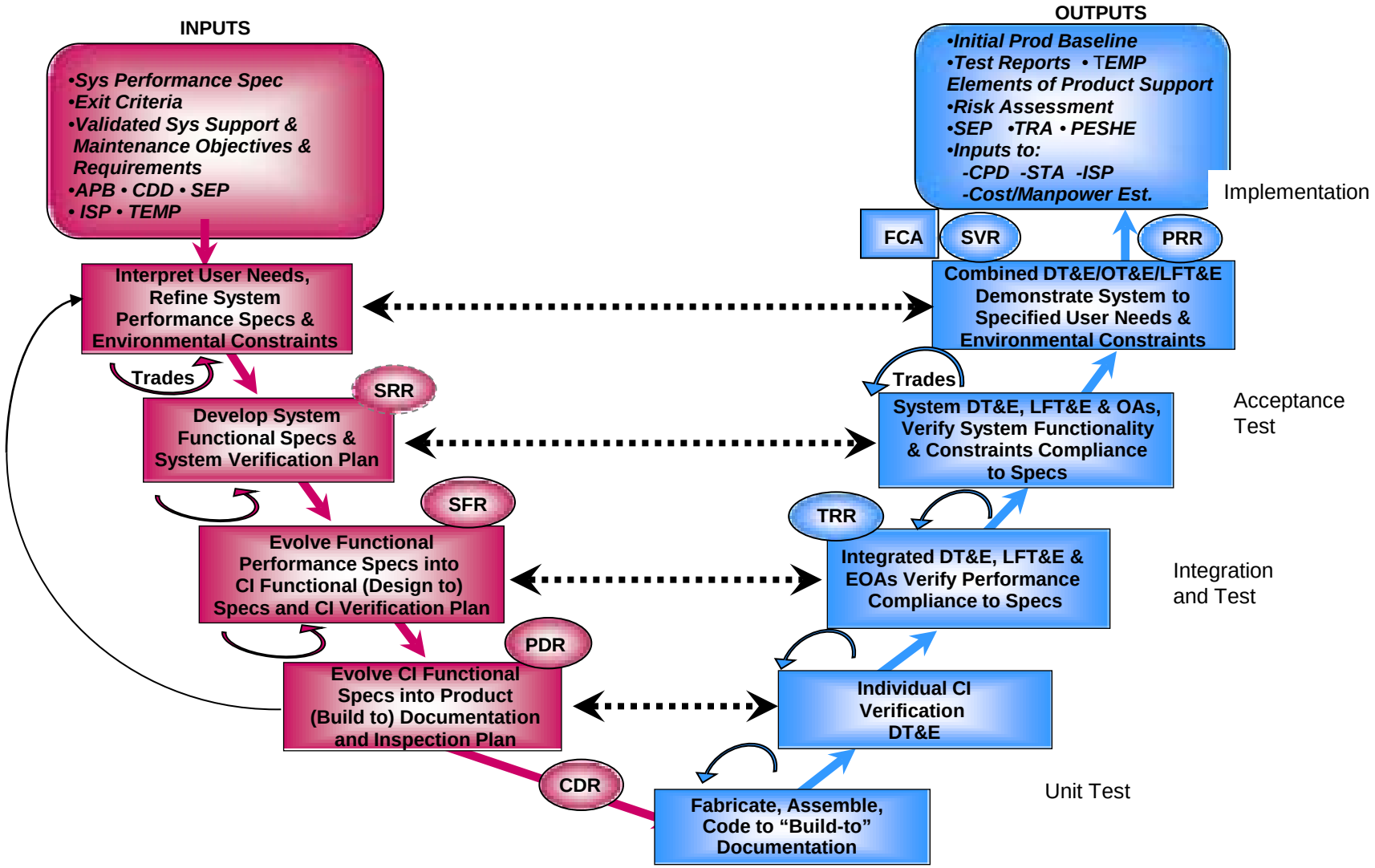
- **The purpose of T&E is to develop and deliver actionable information (knowledge)**
  - Better knowledge enables better decisions
- **T&E developed knowledge informs decisions to reduce risk in requiring, acquiring, and employing systems / capabilities**
- **T&E knowledge is used to:**
  - Assess component performance
  - Assess system capabilities / limitations
  - Assess program progress
  - Assess technical progress
  - Improve the product and processes

T&E Related SE Review Artifacts

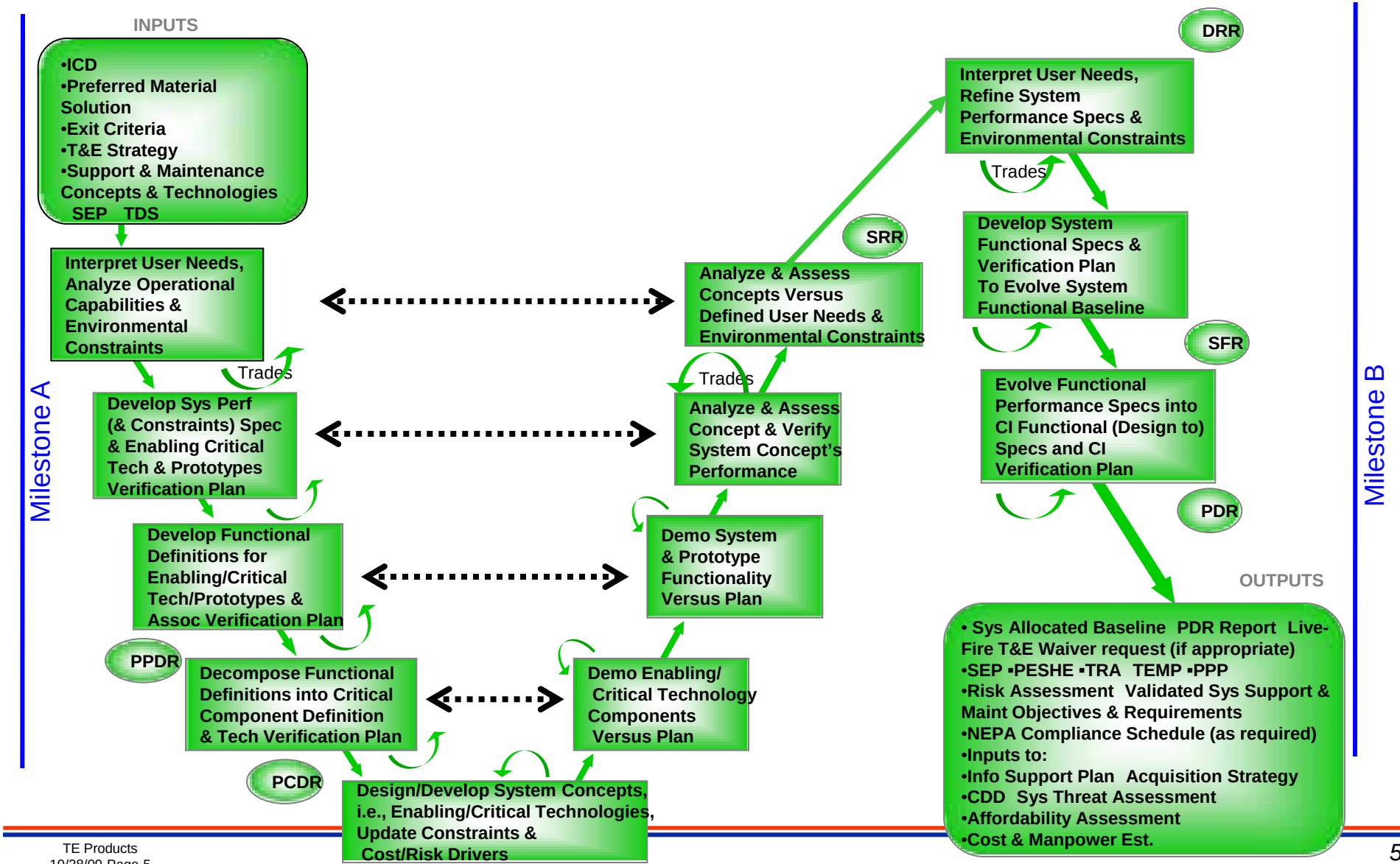


- **T&E Artifacts: T&E strategy, plans, & reports**

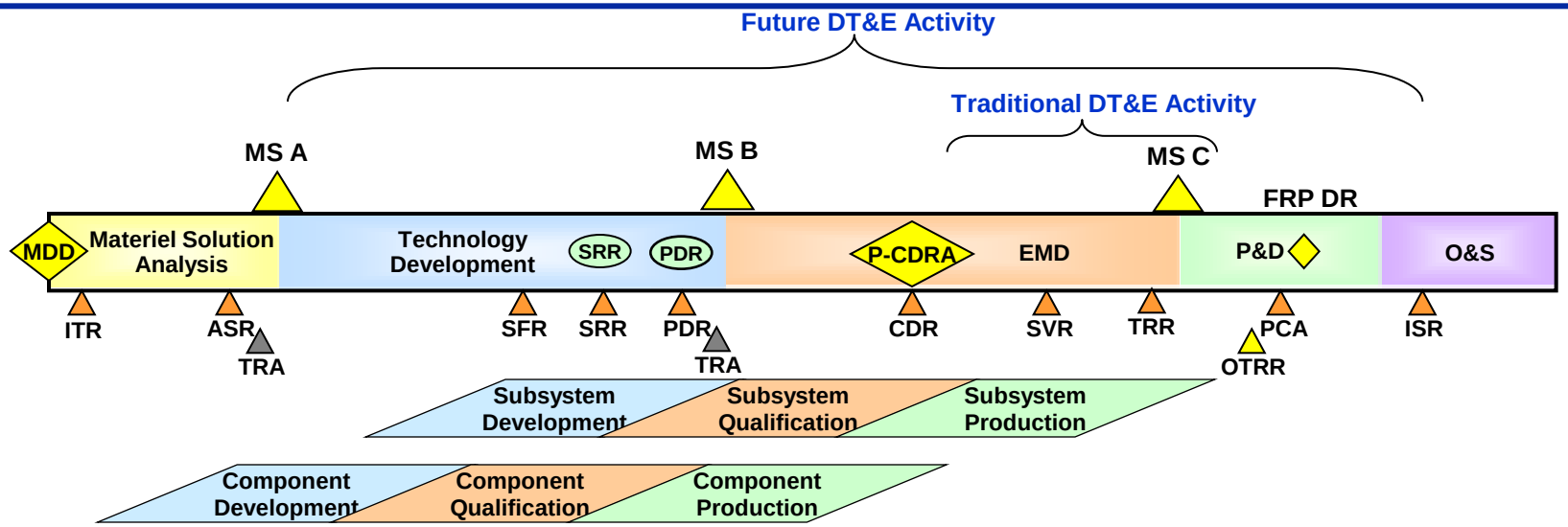
Engineering and Manufacturing Development



Technology Development Phase

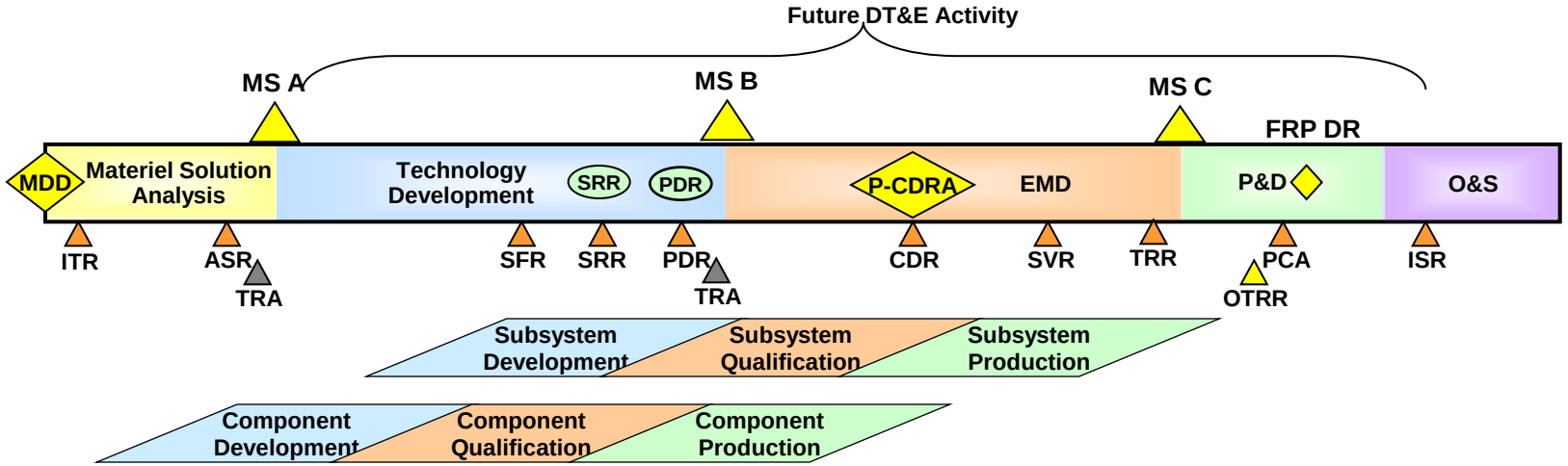


T&E Related Knowledge Needed Earlier



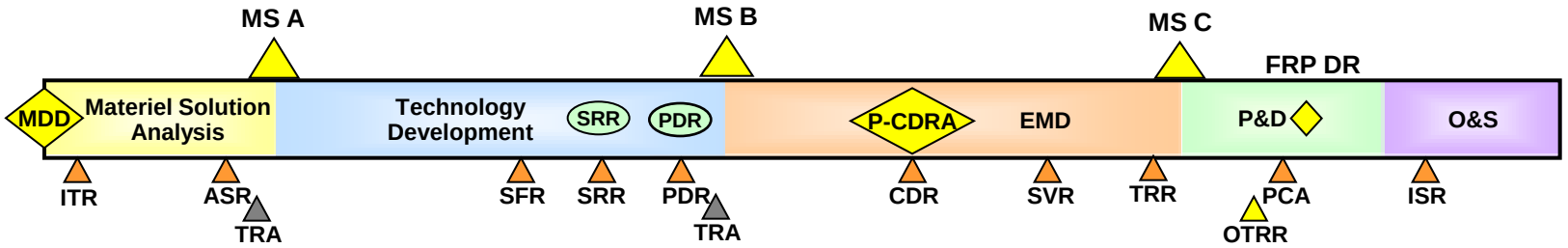
- System-level reviews are a subset of overall technical reviews
- Component and subsystem development efforts are well-underway or complete before system-level design is finalized
- Traditional DT&E programs occur at the system-level, too late to fit into component and subsystem development/qualification cycles
- Better information sooner can benefit subsystem and system-level design decisions

T&E Products at SE Reviews



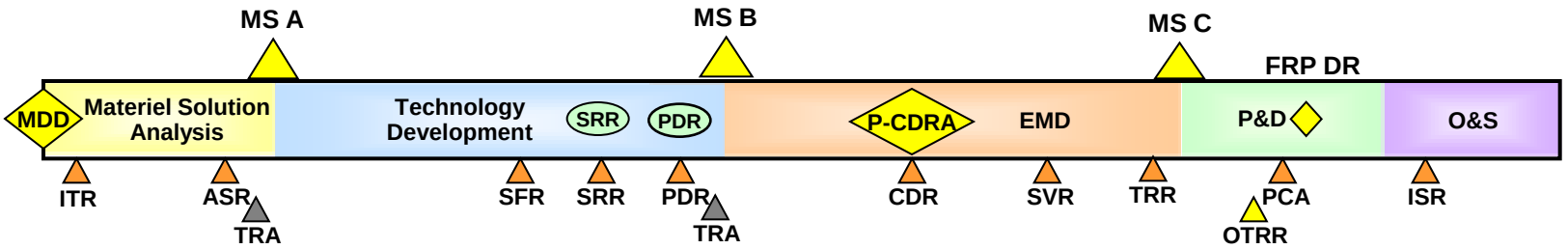
- **T&E products are more than the artifacts – value is in the contents, communications, and process to develop artifacts**
- **T&E information must answer the SE-related questions**
  - Must also represent effective / efficient T&E program
- **Focus on "verification" doesn't use DT&E to full advantage**
- **DT&E should focus on acquiring knowledge of system / subsystem / component (CI) capabilities / limitations**

System Functional Review



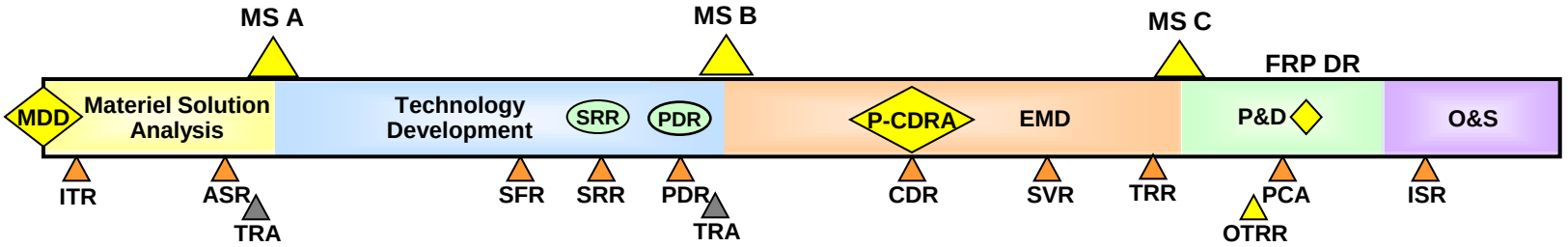
- **Focus: System performance specification – Functional Baseline**
  - Are the technologies mature (enough)? Are the system performance requirements complete?
- **T&E Activity:**
  - System / configuration item (CI) T&E planning
  - Evaluate component / subsystem technology maturity
  - M&S to evaluate alternatives
- **T&E Products: T&E strategy; Technology Development T&E plan**
  - Technology measures / discriminators (TPMs / CTPs)
  - Component / subsystem performance to validate M&S
  - Technology maturity plans & assessments
  - Component maturity plans / capabilities / limitations

Preliminary Design Review



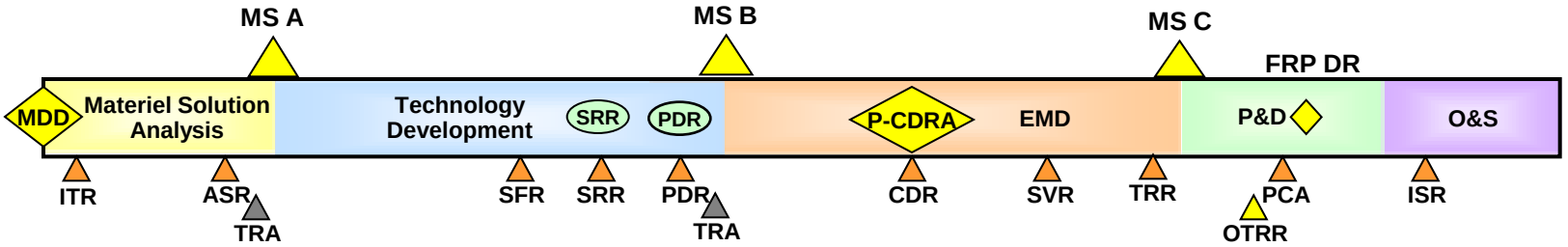
- **Focus: Subsystem/Configuration Item-level design – Allocated Baseline**
  - Functions, performance, interface requirements
  - Is the design ready to go final?
- **T&E Activity:**
  - M&S to evaluate alternatives
  - Technology demonstrations; component T&E
- **T&E Products: T&E Master Plan, system T&E plan, CI T&E plans**
  - TPM assessments
  - M&S validation
  - Technology maturity
  - CI maturity / capabilities / limitations

Critical Design Review



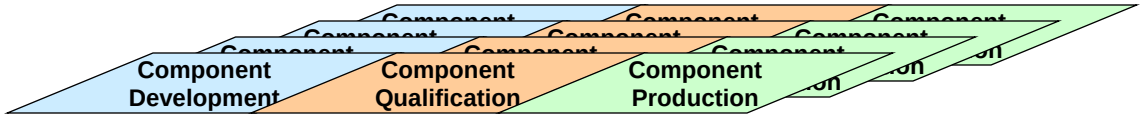
- **Focus: System design review – Product Baseline**
  - Is the design ready to start building / coding?
- **T&E Activity:**
  - CI / subsystem T&E – SIL, HITL, “open air” range
  - M&S to evaluate alternatives
- **T&E Products: TEMP, system T&E plan, detailed T&E plans, CI reports**
  - Integration issues
  - M&S validation
  - Technology maturity assessments
  - Subsystem / CI maturity / capabilities / limitations

Physical Configuration Audit



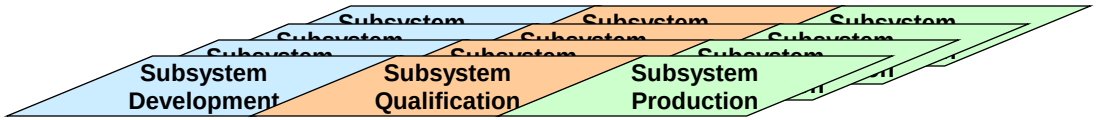
- **Focus: As-Built verification review – Product baselines completed**
  - Is the system (as built) consistent with the product baseline documentation?
- **T&E Activity:**
  - Regression T&E (deficiency corrections)
  - Mission-level T&E
  - Logistics T&E
- **T&E Products:**
  - Deficiency status
  - Support documentation V&V
  - System capabilities / limitations
  - Production process maturity

System Maturity Level 1



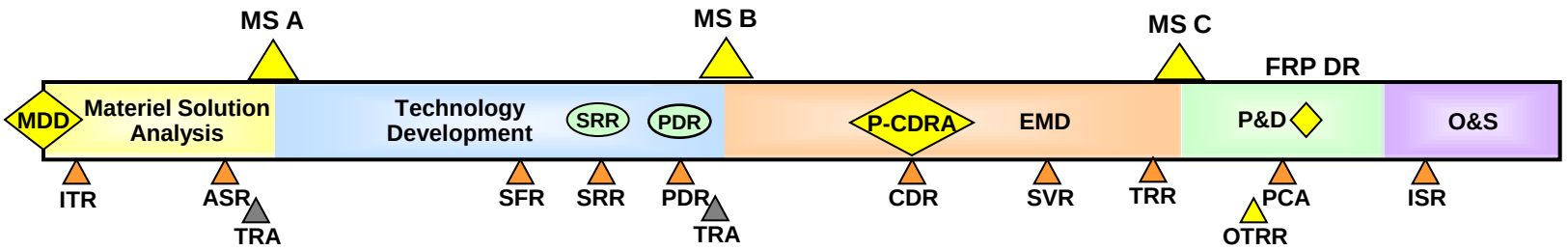
- **Focus: System maturity level 1 – Components work individually**
- **SE Reviews: Component level – all; System level – SFR, PDR, CDR**
- **T&E Activity:**
  - Component SIL, HITL testing
  - M&S to provide missing subsystem & system elements
  - Competitive prototyping
- **T&E Products:**
  - Integration risks
  - Technology maturity
  - Component/CI maturity / capabilities / limitations

System Maturity Level 2



- **Focus: System maturity level 2 – Components work as a system - integration**
- **SE Reviews: Subsystem level – all; System level – PDR, CDR, TRR**
- **T&E Activity:**
  - Component SIL, HITL testing
  - M&S to provide missing subsystem & system elements
- **T&E Products: T&E strategy, system T&E plan**
  - Subsystem maturity / capabilities / limitations
  - Validated M&S
  - Technology maturity assessments

System Maturity Level 3



- **Focus: System maturity level 3 – System works in real-world**
- **SE Reviews: SFR, TRA, SRR, PDR, CDR, SVR, TRR, PCA, ISR**
- **T&E Activity:**
  - System / subsystem / CI DT&E; OT&E
- **T&E Products: T&E strategy, system T&E plan, OT&E**
  - System maturity / capabilities / limitations
  - System supportability and sustainability
  - Operational effectiveness, Operational suitability

Summary

- T&E product is credible knowledge for better decisions
- DT&E provides verification + validation + risk mitigation
- DT&E should focus on efficient & effective knowledge of capabilities / limitations
- T&E developed knowledge should be used at the component, subsystem, and system level

**The right information,
to the right decision maker,
at the right time,
for better decisions.**

Summary

Questions?