



U.S. Army Research, Development and Engineering Command



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

System Engineering Applied to Decision Making
27 October 2011

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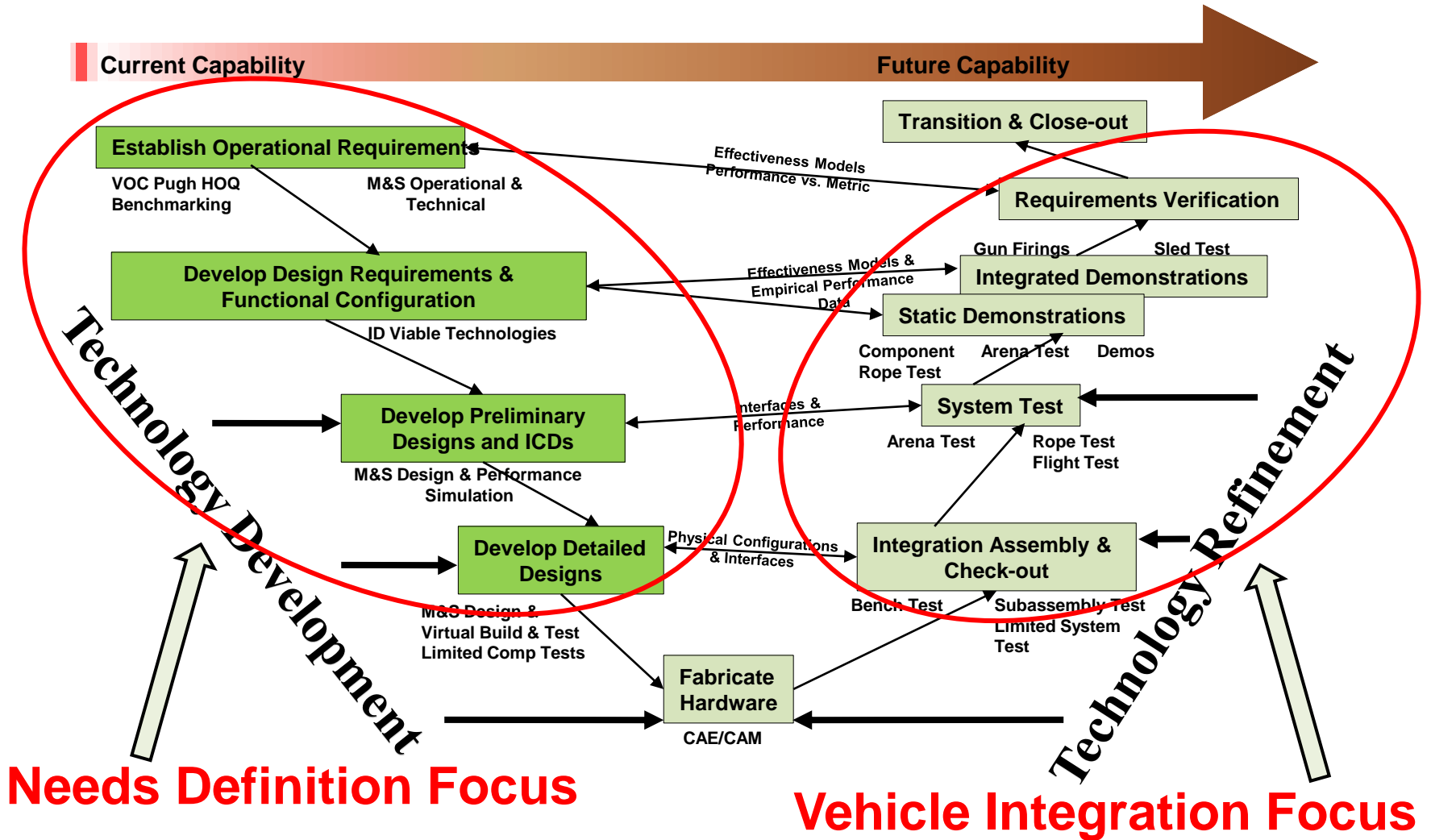
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- Warfighter Needs Must Still Be Met Despite Common Expectation Of Declining Resources
- Challenge To Maximize The Value Of Defense Science And Technology Efforts Requires Their Relevance To The Acquisition Community Mission
- Systems Engineering Techniques Can Be Leveraged As An Effective Tool To Assist In Making Difficult Decisions
- Two (2) TARDEC Systems Engineering Group Support Efforts Are Summarized As Examples Of The Above

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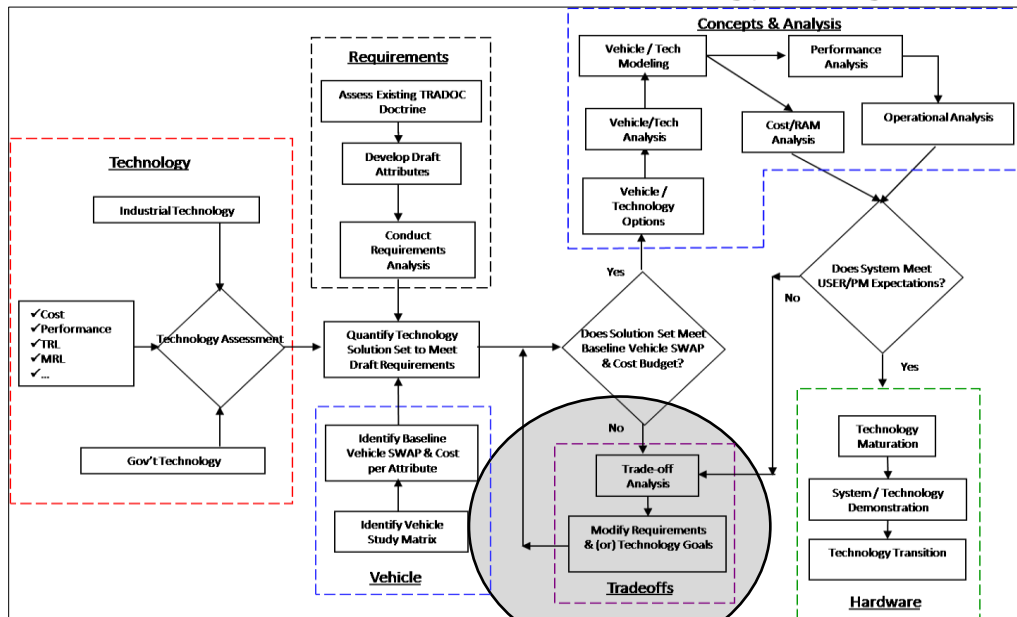
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- Task 1 (May-Oct 10): Using A Specific Vehicle And Mission Set, Develop A Repeatable Process And Necessary Toolset To Analyze The Benefits Of Capability Package Proposed Technologies And Evaluate Tradeoffs Between Performance And Constraints
 - Overall Effect On System Performance
 - Ability To Close Capability Gaps And Meet User Requirements
 - Applied to Capability Package (CP) 11-12
- Task 2 (Nov 10 – Present): Assist the TARDEC Ground Domain Planning and Integration (GDP&I) Team in Technology Needs Analysis To Guide Decisions on S&T Programs

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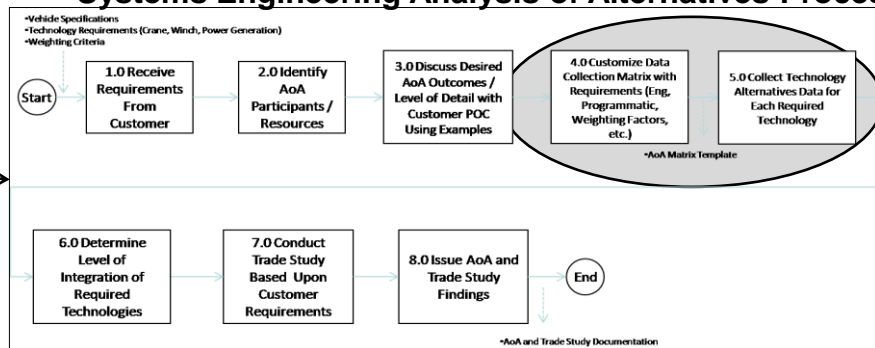
TARDEC Ground Vehicle Technology Integration and Assessment Process



Example Trade Study Criteria Matrix

Criteria	Weighting	Scoring Rationale		
		3 Low	6 Med	9 High
Engineering	15	Hard-requires significant modification of sub-systems	Complex - Impacts multiple sub-systems	Easy - Stand-alone (Bolt-on)
Burdens (SWAPC)				
Ease of Integration				
Testing Required? (schedule to field)				
Production	11	9 months from time of award	6 months from time of award	<3 months from time of award
MRL -Material Availability				
Ease of Production Cut-In				
User Priority	19	Nice to have	Mission Essential	Mission Critical
User(s) Priority				
Logistics	14	Significant Impact	Impact	Minimal Impact
Ease of Retrofit				
Life Cycle Cost				
Field implemented Fixes				
Logistic Footprint				
O&S (log)				
Cost	8	> 20% of total vehicle cost	5% - 20% of total vehicle cost	< 5% of total vehicle cost
Technology Cost				
Life Cycle Cost				
O&S (log)				
Schedule	18	Fielded in > 180 days	Fielded 61-180 days	Fielded in < 60 days
Schedule to Field				
Field Implemented Fixes				
Performance	15	Increase with significant negative impact on other areas	Increase with minimal negative impact in other areas	Significant increase w/o negative impact on other areas
System Effectiveness				
Threshold Threats				
Objective Threats				
Mobility Effectiveness				
RAM				
Employment				

Systems Engineering Analysis of Alternatives Process



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- Objective:
 - Maximize performance based on weighted parameters
- Subject To:
 - *Burdens*
 - *Cost*
 - *Risk*
 - *Growth Potential*
- Target Result:
 - Best suite of technologies for the CP11-12 host vehicle

} Optimization Goal

} Constraints

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- Better Strategy Required For Gathering Data Across Multiple Organizations (e.g. multiple Program Executive Offices (PEOs) and Program Managers (PMs)); Data Gaps Necessitated Use Of Notional Data For Demonstration Purposes
- The Trade Study Team Needs To Be A Central Part Of Integration Team And Drive The Data Gathering Activities And Analysis
- The Trade Study Should Also Be A Part Of Interim Reviews For All Subject Matter Experts (SMEs)

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- Streamline The Process For Collecting Needs Data (Eliminate Re-invention Of New Lists Each Year)
- Contribute To Driving Out Requirements By Decomposing Needs To Enable Appropriate Action
- Assist In Obtaining Metrics Data To Evaluate How Well Programs Meet Needs By Working With SMEs & PM Partners
- Propose Needs Commonality Across PM Platforms
- Facilitate Needs Alignment With Programs
- Provide A Template/Spreadsheet For Needs Data
- Configuration Control Of The Needs Within The Database (Traceability)
- Provide Traceability Of Needs To TARDEC Programs And PEO/PM Capability Gaps IAW Priorities & Budget
- Generate Reports To Support Program Decisions

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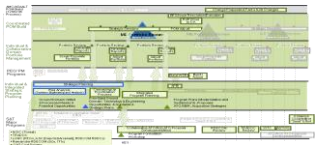
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TARDEC SEG Focus

- Project Execution Management**
- TARDEC Evaluation
 - Project Management Best Practice Standardization
 - Earn Value Management Training
 - Project Governance
 - Project Health Dashboard



- Assess Balance and Alignment to Strategy
- Refine Recommended Strategy



Balance Portfolio to align with Ground Domain Priorities

Portfolio Assessment

- Portfolio Assessment**
- Analyze portfolio balance and alignment for leadership and tech developers.
 - Monitor portfolio health and assess impacts from changes.

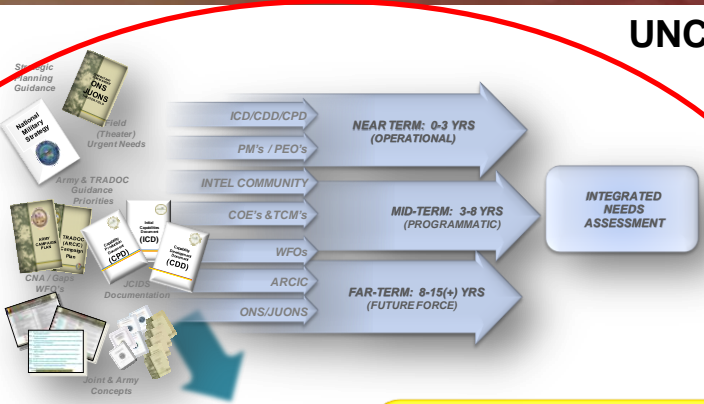
Identify and Prioritize Gaps

Align Investments to Meet Ground Domain Priorities:

- Combat Vehicles
- Tactical Vehicles
- Robotics
- Base Camps

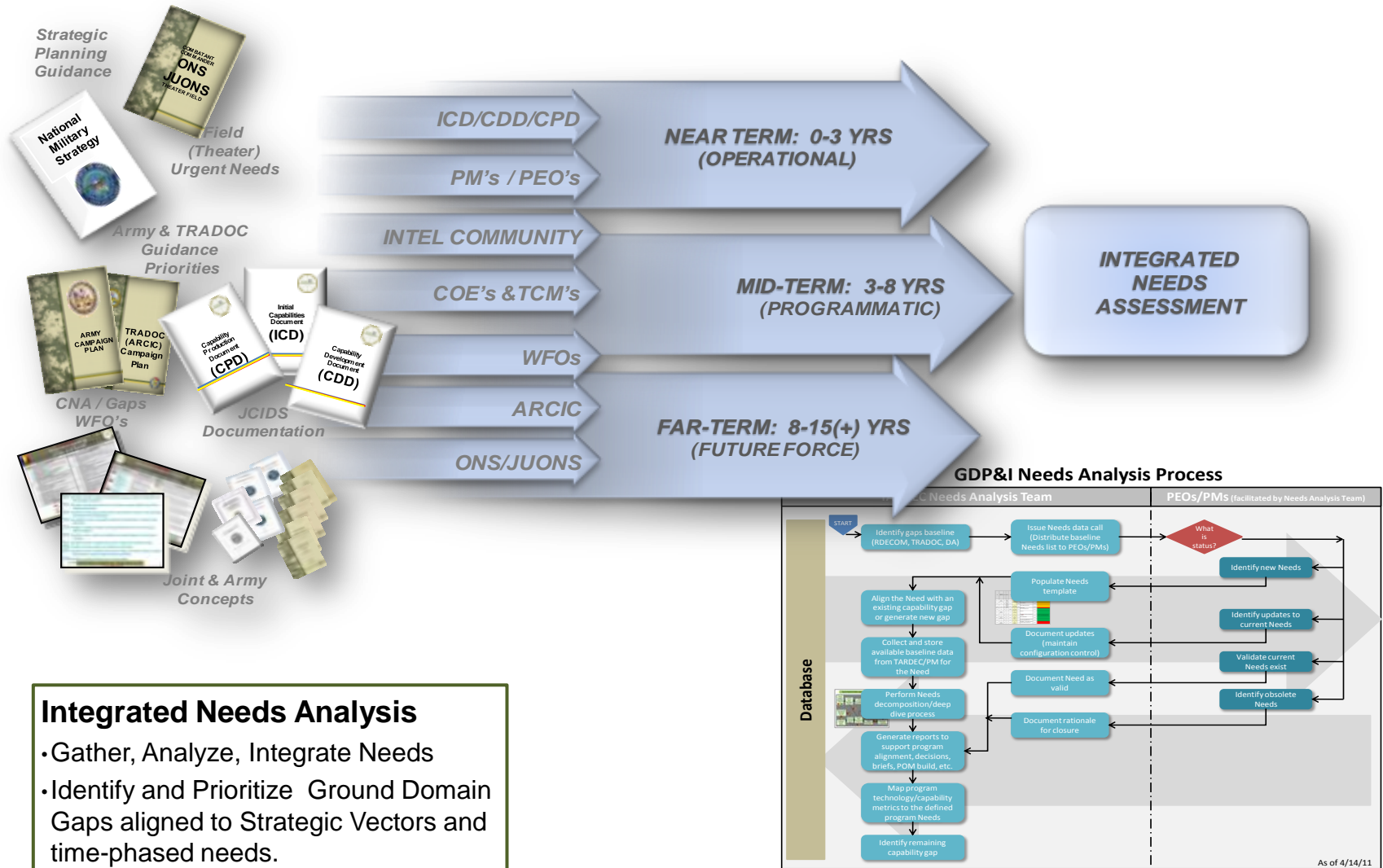
- Strategic Project Planning**
- Coordinate Tech Gaps
 - Align Acquisition/ST&T Plans and Schedules
 - Develop Ground Strategic Technology Plans & Roadmaps
 - Annual POM Planning
 - Annual Guidance

- Strategic Needs Analysis**
- Gather, Analyze, Integrate Needs
 - Identify and Prioritize Ground Domain Gaps aligned to Strategic Vectors and time-phased needs.



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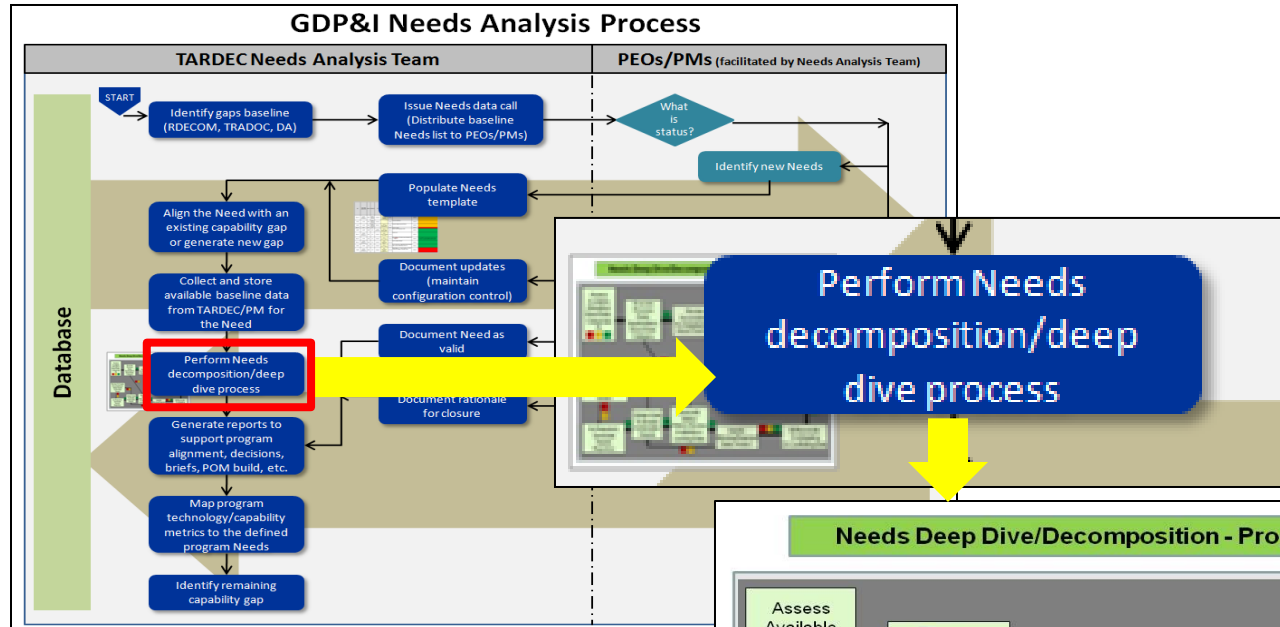


Integrated Needs Analysis

- Gather, Analyze, Integrate Needs
- Identify and Prioritize Ground Domain Gaps aligned to Strategic Vectors and time-phased needs.

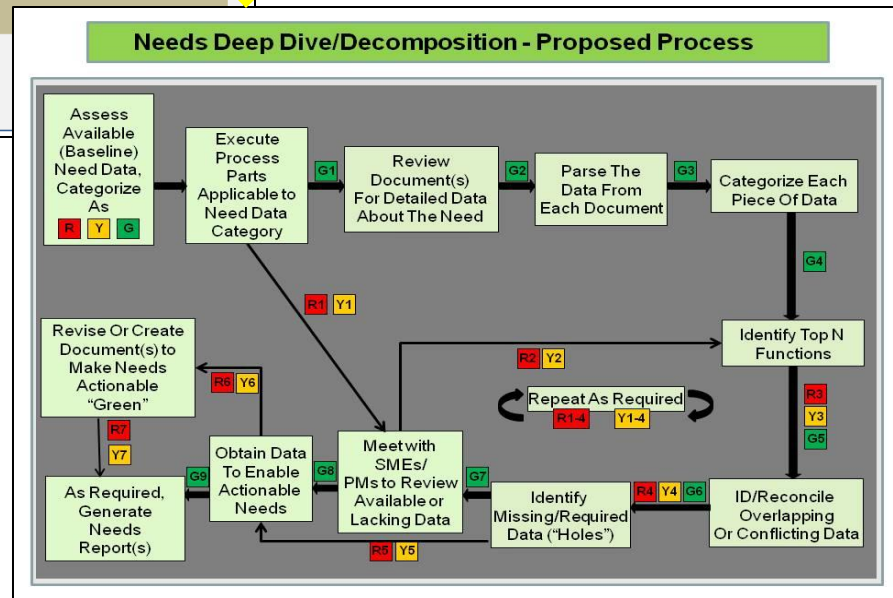
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Decompose Needs into Requirements

- Identify and document Functions, Performance, Constraints, Interfaces
- Verify with product and tech area SMEs



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- Systematic Needs Analysis Aids Alignment of Warfighter (Customer) Requirements to R&D/S&T Portfolio
- Needs Analysis Conducted Across Multiple PEO/PM Communities Can Identify Common Programs To Deliver Most “Bang for the Buck”
- Long Term Technology Development Might Not Match PM time frame of interest, normally focused to the POM Cycle

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Questions?

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Systems Engineering Applied to Decision Making

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