JCTD 101 Overview for Advanced Capability Development

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DAU Webcast Forum
21 October 2020
1. **Recognize** the “Tectonic Shifts” within OUSD(R&E)

2. **Understand** “Technology Advancement” (vs “Enhancing Capabilities”)

3. **Align** Strategically, Operationally, & Tactically

“Success no longer goes to the country that develops a new technology first, but rather to the one that better integrates it and adapts its way of fighting.” – 2018 National Defense Strategy
USD(R&E) Mission

**Ensure Technological Superiority for the U.S. Military**
- Set the technical direction for the Department
- Champion and pursue new capabilities, concepts, and prototyping activities throughout the DoD research and development enterprise

**Bolster Modernization**
- Pilot new acquisition pathways and concepts of operation
- Accelerate capabilities to the warfighter

**R&E’s Priorities**
- Harness DoD’s unique authorities to pursue bold innovation
- Strengthen partnerships with small companies and universities
- Enhance R&D collaboration with global allies

“What I’ve learned is that in order to get the most out of the federal government’s technology ecosystem to drive innovation…You need to be better coordinated across all aspects of the ecosystem,”

– Acting Under Secretary Kratsios, August 2020
The Powers & Politics At Play
Defense Iron Triangle & Big “A” is the game field we are on

House Appropriations Committee – Defense (HAC-D)
Senate Appropriations Committee – Defense (SAC-D)
House Armed Services Committee (HASC)
Senate Armed Services Committee (SASC)

“Big A” Acquisition
Effective Interaction Essential for Success
Budgeting
Requirements Generation and Validation
Acquisition

House Appropriations Committee – Defense (HAC-D)
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“Big A” Acquisition
Effective Interaction Essential for Success
Budgeting
Requirements Generation and Validation
Acquisition

Large Defense Companies
Medium Defense Companies
Consulting Firms (Small Companies)

Department of Defense
OUSD(R&E), Joint Staff, Service, CCMDS
And Other Govt. Agencies

Congress
funding & Political support
electoral support
policy choices & execution
congressional support, via lobby

low regulation, special favors

Bureaucracy
BLUF: DoD Innovation Ecosystem
(Generalized Depiction)

STRATEGIC DISCOVERY to STRATEGIC DELIVERY

Service/CCMD S&T Executives:
Universities, Labs, and Centers

CCMDS (Warfighting), Services (Title-10) and Industry (DIB)

Technology/Capability Development
Explore  Develop  Transition

Product Development

AC-P&E (Joint & New)
WLIF (O&M for Adv CONOPS dev) / Labs (Service)
SCO (Repurpose Existing) / DIU (Repurpose Commercial)

DARPA / R&T / Labs

PEOs & PMs / RCOs (Service)

TRL 1-3 → TRL 4-6 → TRL 7-8 → TRL 9
BA 6.1 & 6.2 → BA 6.3 & 6.4 → BA 6.5, 6.7, & 6.8

Technology/Capability Development
TRL 1-3  TRL 4-6  TRL 7-8  TRL 9
Advanced Capabilities
(Aligning Modernized Force Development)

Joint Warfighting
Engineering
Prototyping

The Trifecta—Applying Disciplines

Modernizing the Force

SIAC
EXPLORE
Concurrent Development & War Games

EP&S
ENABLE
Infrastructure, Standards, & Guidance

A&S
BALANCE
Manage/Balance Acq. Portfolio

DoD/Industry
DRIVE
Innovation, Threats, Technology, New Force Concepts

ESTABLISH
Mission Engineering Architectures & Evaluations

IMPLEMENT
Solutions

• Services & Programs
  • P&S
  • TRMC

Joint Staff

Provide Modernized Force

Modernizing the Force

DoD/Industry
DRIVE
Innovation, Threats, Technology, New Force Concepts

ESTABLISH
Mission Engineering Architectures & Evaluations

IMPLEMENT
Solutions

• Services & Programs
  • P&S
  • TRMC

Joint Staff

Provide Modernized Force
Joint Mission Forum

Goal: JS/OSD/Military Service/CCMD/defense agency forum to review capability gaps and current prototyping efforts, and develop strategies to rapidly (1-4 years) develop prototypes and approaches to critical warfighting needs

- Leverage On-Going JS J7/J8 IPL/Mission Analysis Activities
- Promote awareness across the Department of common capability gaps and innovative solutions
- Reduce unnecessary duplication
- Shape future DoD prototyping and experimentation investments and priorities
- Inform annual call for proposal letters

Participants: JS, OSD, CCMDs, Military Services, and defense agencies

Frequency: Every six months (Fall and Spring)

Structure: Three days – two day working group and one day Senior Leader review

Exploit existing investments to meet a broader set of warfighting gaps and shape future investments
Strategic & Operational Alignment:
(R&E Prototyping to NDS & Modernization Areas)

Yesterday
(pre-2019)

Today
(2019-2020)

Tomorrow
(2021 and beyond)

National Defense Strategy

Joint Warfighting Concepts
R&E Modernization Areas

Prototype Portfolio

Product Architecture

• Weapons
• Platforms
• Command/Control
• Fire Control

Prototype Portfolio

Mission Engineering

Product Architecture

• Industry
• Allies/Partners
• Combatant Commands
• Services

Prototype Portfolio

National Defense Strategy

Joint Warfighting Concepts
R&E Modernization Areas

Project Proposals

• Combatant Commands
• Services

Prototype Portfolio

Project Selection Objectives

• Vetting
  o Technical Merit
  o Military Utility
• Eliminate cross-Service redundancy
• Transition agreement
  o Co-funding

• Principle Director Roadmaps
• Joint Missions*
  o Long Range Fires
  o Electronic Warfare
  o Space
  • Vetting
  • Eliminate cross-Service redundancy
  • Transition agreement

• Analytically Developed Mission Reference Architectures
  o Joint Staff Mission Priorities
  o Mod Areas Integrated with JWC
  o Aim to Support AND Disrupt JWC
  • Vetting
  • Eliminate cross-Service redundancy
  • Transition agreement

Subject of today’s discussion and proposed project selections

*Qualitatively determined and coordinated with Joint Staff
Tactical Alignment
(R&E Prototyping to MPAs)

Project Selection & Execution

Prototypes and Experiments

Mission Architecture

National Defense Strategy, R&E Modernization Areas
Joint Warfighting Concepts

Mission Engineering

Product Arch
Portfolio Req’s

Stakeholders
• Combatant Commands
• Services
• Allies/Partners
• Industry

Capability Development

Prototype Demonstrations

Mission Prototypes
Prototypes & Experiments (P&E)

**Mission:** Identify, develop, and demonstrate innovative technical concepts to address defined national security challenges faced by the DoD, Joint Force, and Combatant Commands (CCMDs).

**Characteristics of P&E Projects**

- Span *Joint mission priority areas* and *DoD modernization priorities*
- *In-year selection* process for greater agility and responsiveness
- Co-sponsors (*co-funding*) are critical to success
- Emphasize *user involvement* with technology demonstration and experimentation
- Most provide *residual capabilities* for the Warfighter
- Informs requirements development (*JCIDS*)
- Include *transition* planning from the start
P&E Programs Elements

- **DM&P includes:**
  - QRSP
  - ECTD/RT
  - JCDC

- Defense Modernization & Prototyping (DM&P)** 6.3
- Joint Capability Technology Demonstration (JCTD) 6.3
- Rapid Prototyping Program (RPP) 6.4

<table>
<thead>
<tr>
<th>Project Duration (months)</th>
<th>Proposal Limits per Year OSD Funds ($M)</th>
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<tbody>
<tr>
<td>6</td>
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Balanced Portfolio Approach

P&E core investments: 80%+ of portfolio
- Flagship Joint Mission Capabilities
- Address modernization gaps and peer engagement
- Leverage novel contracting pathways to achieve LRIP in 30 months
- Joint US/Ally initiatives to develop critical capabilities

- Rapid prototyping and Joint demonstration venues
  - Mature technology prototypes to quickly provide a residual capability
  - High-fidelity demonstration to down-select technologies and inform new capabilities

Hedge investments: <20% of portfolio
- Low cost projects with high potential return
- Quickly leverage innovation from academia, Service labs, commercial, and non-traditional sources
- Capitalize on partner nation investments

Investment strategy represents notional planning targets, not quotas
**Strategic Alignment**

2018 National Defense Strategy

- Build a more lethal Joint Force
- Strengthen alliances & attract new partners
- Reform for greater performance and affordability

**Operational Alignment**

DoD Modernization Priorities

- 5G
- Autonomy
- Cyber
- Fully Networked C3
- Microelectronics
- Space
- AI / ML
- Biotechnology
- Directed Energy
- Hypersonics
- Quantum

**Tactical Alignment**

Goal: Balanced portfolio addressing emergent Joint critical mission needs

1. SCIFIRE Portfolio / Allied Prototyping Initiatives
2. Time Sensitive Targets-Left of Launch
3. Electronic Warfare / EM Spectrum Dominance
4. Fully Networked C3
5. Fire Support Next (FSN) / Integrated Fires
6. Rapid Precision Strike / Hypersonics
7. Contested Logistics
8. Assured PNT
9. Persistent ISR
10. Information Dominance
11. Cyber Effects Operations
12. *Air and Missile Defense*
13. *Counter UAS*

* Dropped after FY2021 Defense Wide Review (DWR)
Prototyping Senior Steering Group (PSSG) Pipeline (>$1M per yr)

Prototype and Demonstration/Experimentation Opportunities

Advisory Board to determine funded Prototypes and Demonstrations/Experimentations

Funding Sources

Prototype Proposals, BAA, API, Campaigns, SIAC, Mission Gaps, AD Roadmaps

PSSG Chair: DD(P&S)
Participants: JS, CCMD, Services, ADs

PSSG Evaluates incoming prototype and demonstration / experimentation proposals. Advisory output is prioritized list with identified funding and transition partners

Prototype 1
- Funding Source
- Transition Partner

Prototype 2
- Funding Source
- Transition Partner

Demonstration / Experimentation
- Funding Source
- Lead
Mission: JCTD executes prototypes and experiments to address DoD strategic needs, fill operational gaps, and reduce technical risk

WHY AN OSD PROGRAM?
1. Serves as a primary RDT&E vehicle for Combatant Commands (CCMDs)—Delivers capability 2-4 yrs
2. Addresses Joint capability gaps that present significant risk and suffer from inadequate Title-10 investment
3. Collaborative via Service Co-Funders (1:2 $ ratio)
4. Technology Accelerator—speeds up delivery of residual capabilities to CCMDs, while addressing long-term transition into Service PoRs

SEC. 251, 2006 NDAA (PL 109-163, Jan 6, 2006) addressing recommendations following Congressionally directed Comptroller General report on RDT&E PE structures (GAO-06-883, “Stronger Practices Needed to Improve DoD Technology Transition Processes”), Deputy Undersecretary of Defense for Advanced Systems and Concepts (DUSD(AS&C)) established the JCTD Program to demonstrate capabilities 1-2 years earlier than ACTDs, with greater speed and a focus on CCMD needs


SEC. 8058, NDAA 2020 requires the JCTD Program Office to notify Congress of planned new-start JCTD projects, and prohibits obligation of funds for new-starts until 45 days after submission of such notice

CJCSI 5123.01H (Aug 31, 2018) A JCTD may be a substitute for a formal Capabilities Based Assessment (CBA). For Acquisition Category (ACAT) II and below programs, Initial Capabilities Documents (ICD) are not required when the mission need is identified via the JCTD
JCTD Tails & New Starts Summary
DoD Modernization Priorities (FY20 – FY24)

(Total, $435.90M) JCTD Investment by DoD Modernization Area

- FNC3, $94.13, 22%
- Autonomy, $86.91, 20%
- AI/ML, $54.06, 12%
- Other, $159.19, 36%
- Cyber, $17.28, 4%
- Cyber, $17.28, 4%
- Other, $159.19, 36%
- FNC3, $94.13, 22%

OSD JCTD Funding Total: $435.900M
Additional Co-Funding Total: $761.077M
GRAND TOTAL = $1,196.977M
JCTD Tails & New Starts Summary
E2E Joint Mission Priorities (FY20 – FY24)

(Total, $435.90M) JCTD Investment by Joint Mission Priority

- Cyber Effects, $15.30M, 4%
- Persistent ISR, $34.99M, 8%
- EW, $44.66M, 10%
- Information Dominance, $44.90M, 10%
- Other, $59.92M, 14%
- APNT, $13.90M, 3%
- FNC3, $67.86M, 16%
- Fire Support Next, $13.81M, 3%
- TST, $68.65M, 16%
- Contested Logistics, $71.91M, 16%

OSD JCTD Funding Total: $435.900M
Additional Co-Funding Total: $761.077M
GRAND TOTAL = $1,196.977M
Q: How Do **WE** Gain Technological Advantage in Our Capability Development?

A: It is All About the Projects **WE** Select and How **WE** Execute.
Approach: Both “Art & Science”
Proposal Development is an exercise in critical thought from a “Learning Organization’s” perspective

Blooms Revised Taxonomy

- **Creating**
  - The student can put elements together to form a functional whole, create a new product or point of view: assemble, generate, construct, design, develop, formulate, rearrange, rewrite, organize, devise.

- **Evaluating**
  - The student can make judgments and justify decisions: appraise, argue, defend, judge, select, support, evaluate, debate, measure, select, test, verify

- **Analyzing**
  - The student can distinguish between parts, how they relate to each other, and to the overall structure and purpose: compare, contract, criticize, differentiate, discriminate, question, classify, distinguish, experiment

- **Applying**
  - The student can use information in a new way: demonstrate, dramatize, interpret, solve, use, illustrate, convert, discover, discuss, prepare

- **Understanding**
  - The student can construct meaning from oral, written and graphic messages: interpret, exemplify, classify, summarize, infer, compare, explain, paraphrase, discuss

- **Remembering**
  - The student can recognize and recall relevant knowledge from long-term memory: define, duplicate, list, memorize, repeat, reproduce

**Execution Projects, Implementation Directives & POA&Ms**
“Art of Common Vision”

**Capture Key Take-A-Ways & Artifacts to Draft the Proposal**
“Art of Thesis Dev”

**Peer/Group Discussions & Advocacy Building**
“Art of Diverse Views”

**Reading, Research & Preparations**
“Art of Literature Review”
阅读是 fundamental
建立您的图书馆和自学，以重新获得我们的技术优势


DAU & NDU Websites


Methodology & Critical Network of Partners

Heilmeier Catechism

Concept Nomination
- Needs pull
  - CCMDs
  - JS
  - IA/IC
  - Services

Project Selection
- TECH push
  - Industry
  - Labs
  - DARPA
  - FFRDC
  - Non-traditional
  - Services
  - IC
  - ADs
- OSD Leadership
- Assistant Directors
- Co-Sponsors
- Partners
- SMEs & Partners
- Customers

Project Execution
- Co-Sponsors
- Partners
- Customers

Project Transition
- Co-Sponsors
- Partners
- PoRs & PEOs

Art of the Possible

Problem set awareness
- Successful program execution

P&E links the capabilities of three critical partner networks
• **Who, When & Where:** Sponsor virtually shapes proposals with the PSA starting > 180+ days out (ideally) prior to O-TAP
  - **Group Shaping** = Dir/Dep JCTD, OEs, Technical SMEs, R&E LNOs, CCMD & Service Reps

• **What:** proposal development (e.g. 3 - 4 turns)
  - **Endstate:** technically **feasible**—Jointly **supportable**—JCTD **acceptable**

• **Why:** proactively and efficiently shape JCTD proposals to what is needed and affordable
  - **O-TAP** = becomes Counsel of Colonels (06/GS-15 S&T) Rack & Stack
  - **PSSG** = becomes Confirmation Brief for Joint S&T Executives to advise DD-P&S Funding Decisions

• **Feedback:** provided at each Turn
  - **Time/Efforts** only on projects we want
  - Proposing team to resubmit with corrections, clarifications, etc.

• **Goal:** Reduce number of JCTD proposals to a manageable number with well written Proposal Packages
Current P&E Kill-Chain Roadmap

![Kill-Chain Roadmap Diagram]

Rev 01Oct2020b
Autonomy Roadmap Functional Areas

Capability/Functional Areas ... in support of Kill-Chains

Overarching Functional Requirements

- Open/modular autonomy architecture
- Autonomy algorithms for task management, cost functions, triggers/behaviors, etc.
- Self organization: path planning & execution, dynamic response, compensation for attrition, etc.
- Cognitive machine decision processing: sensor selection/tasking, cross platform collaboration
- Target location and identification
- Strike support: maintain protected entity, UAV and threat positions/key techniques
- Data sharing
- Coordinated, adaptive, distributed effects: autonomous EW tactics and techniques
- Collaboration across platforms in formation
- Mission execution satisfies tactical execution plan

- A.1 Netted and Distributed Autonomy
- I.2 Collaborative Autonomy Delivering ISR Effects
- E.3 Collaborative Autonomy Delivering EW Effects
- M.4 Collaborative Autonomy for Mission Planning & Operations
**Initiate Execution:** seven (7) JCTD new-start FY20 projects – total investment (OSD-$47.17M/Partner-$88M)

**Team Sport:** OE, IMT, IA = UNITY OF EFFORT vice Unity of Command

<table>
<thead>
<tr>
<th>Project Title/Stakeholder</th>
<th>Priority(ies) *</th>
<th>Overall JCTD Total</th>
<th>Partner Funding</th>
<th>Cost Share %</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSCE (USCENTCOM)</td>
<td>Cyber Effects Operations</td>
<td>$9.04M</td>
<td>$14.35M</td>
<td>39%</td>
<td>Will create several transition products with data processing at the tactical edge to include a sea prototype design that enable 180 degree field of view data collection design for operating on medium to large vessels and an airborne system.</td>
</tr>
<tr>
<td>NORTH (USSTRATCOM)</td>
<td>Information Dominance</td>
<td>$6.57M</td>
<td>$8.78M</td>
<td>43%</td>
<td>Enhanced Fully Networked C3 data and voice over long range terrestrial links by developing a survivable, resilient radio frequency network that will sustain communications in spectrum contested environments.</td>
</tr>
<tr>
<td>CREED (USINDOPACOM)</td>
<td>Contested Logistics</td>
<td>$7.00M</td>
<td>$7.00M</td>
<td>50%</td>
<td>Deliver logistical deception kits to confuse and deny enemy ISR. These kits will provide tools to conduct multispectral tone-down focused on logistical nodes, e.g. deceptive signatures that mimic emplacing forward fuel caches. Will transition a capability to the USAF, USN, USMC, and USA that will make permanent and expeditionary airfields and logistics hubs more survivable.</td>
</tr>
<tr>
<td>ACES (USSOUTHCOM)</td>
<td>Contested Logistics</td>
<td>$4.58M</td>
<td>$5.60M</td>
<td>45%</td>
<td>Automated concrete 3D printer capable of constructing facilities and obstacle crossing, using locally available materials; will enable enhanced battlefield mobility, and force protection for the joint forces in theatre.</td>
</tr>
<tr>
<td>AMPA (USSOUTHCOM)</td>
<td>Persistent ISR</td>
<td>$4.10M</td>
<td>$22.10M</td>
<td>16%</td>
<td>Large-scale autonomous solar airborne ISR platform, capable of persistent (up to 90-day) deployment at distance with 800 lb. payload, able to find, track, and ID targets; mission set applies to multiple CCMDs and Services.</td>
</tr>
<tr>
<td>ATOMIC/A (USEUCOM)</td>
<td>Electromagnetic Spectrum</td>
<td>$7.20M</td>
<td>$10.64M</td>
<td>40%</td>
<td>Portable self-contained sensor system that can be integrated onto any platform, provides the unprecedented ability to materialistically determine the contents of an unknown object in any environment (land, underwater, buried, behind walls) from a short standoff distance without touching, opening, or disturbing the object; Transition to USA, USN, and USMC; Further usage could extend to DHS.</td>
</tr>
<tr>
<td>STAMP (USINDOPACOM)</td>
<td>Contested Logistics</td>
<td>$8.68M</td>
<td>$19.63M</td>
<td>31%</td>
<td>Provide mobile, lightweight, fast-forming vehicle-based power generation to create a cyber secure, intelligent power network; provide power to weapon systems, vehicles, command posts, hospitals, ports, and airfields more efficiently than the current power generator solution.</td>
</tr>
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</table>
Tenants of Successful JCTD Execution
(Execution & Programmatic)

- **Intelligence drives Ops**
  - Strategic Intelligence & Analysis Cell (SIAC)

- **CCMD Primacy (Niche)**
  - Short- and Long-view

- **JCTD is a Joint Sport**
  - Everyone should use the R&E LNO
  - Seams, Cracks & Fishers
  - Co-Funding = Transition
  - Agility w/ In-Year Selection
  - Joint Staff-JFIC & Service S&T Advisors

- **Work a CCMU—Clear, Complete, Mutual Understanding**
  - Capability Gaps
  - Requirements (KPPs & KSAs)

- **O-TAP Evaluation (e.g. Co-Equal)**
  - Risk Tolerance is Increasing
  - Operational & Technical Impact
    - Disruptive = ~40-50%
    - Revolutionary = ~20-40%
    - Evolutionary = ~10-20%
    - Sustainment = <10%

- **Science & Engineering Excellence (Technical Merit)**
  - DD-Engineering
  - DTE&A

- **Assessments (Niche)**
  - Frameworks / Models
  - Independent
  - Military User Assessment
  - Part of the IMT & Kick-off; bring into proposal development
  - Early & Often; Fail Cheap

- **Metrics Matter**
  - Winning or Losing?
  - Beauty in the eye of the definer
  - Informs decision making
  - Status = Cost, Schedule, Performance
  - Impact = ROI, Relevance, Timeliness, Innovation Impact

- **Our Role in the DoD Innovation Eco-System (Niche)**
  - JCTD Program Element (R2)
  - Role of the Oversight Executive
  - Role of the OM, TM, XM
  - Role of the Independent Assessor (IA)

- **Transition Definitions (Niche)**
  - 65-70% = Capability Delivery
  - 20-25% = Capability Enabler
  - <10% = No Transition
GOAL = Strategic Asymmetry (technologically, temporally, operationally, logistically, fiscally, etc.)

1. **Recognize** the “Tectonic Shifts” within the Department

2. **Understand** “Technology Advancement” (vs “Capability Enhancement”)

3. **Align** to Joint Mission Priority Areas

**JCTD Foundational Must Reads**

- **National Defense Strategy**

- **DoD Modernization Roadmaps**
  - [https://intelshare.intelink.gov/sites/DDREM/](https://intelshare.intelink.gov/sites/DDREM/)

- **2020-2021 Joint Mission Priorities**
  - [https://www.dodtechipedia.mil/dodc/display/JCTD/Training](https://www.dodtechipedia.mil/dodc/display/JCTD/Training)

- **OSD Comptroller RDT&E Exhibits ($ = Policy)**

- **Key Testimony (e.g. USD(R&E) on Mar 2020)**

- **Dir, P&E Annual Call Letter**
  - [https://www.dodtechipedia.mil/dodc/display/JCTD/Training](https://www.dodtechipedia.mil/dodc/display/JCTD/Training)
Metrics Matter
(Execution & Programmatics)

Cost
- Green: 92%
- Yellow: 8%
- Red: 0%

Schedule
- Green: 62%
- Yellow: 38%
- Red: 0%

Performance
- Green: 100%
- Yellow: 0%
- Red: 0%

Transition
- Green: 100%
- Yellow: 0%
- Red: 0%

ROI ($Ms)
(for 39 Active JCTDs)
- OSD: $494
- Cofunding: $364

Relevance
- Green: 100%
- Yellow: 0%
- Red: 0%

Timeliness
- Green: 100%
- Yellow: 0%
- Red: 0%

Innovation
- Disruptive: 8%
- Revolutionary: 20%
- Evolutionary: 26%
- Sustainment: 46%
Prototype delivered to Program of Record or Joint warfighter as a capability, or significant component of a capability

Examples:

- **Immediate Use**: Operational prototype delivered to CCMD, Service, or end users (e.g. GSA Schedule) for immediate use; Prototype meets the needs of the Warfighter

- **Existing POR**: Capability/technology absorbed directly into existing Service program of record

- **New POR**: Prototype Demonstrated validates Requirements and Program of record established around prototype capability

### P&E Results of Projects Ending in FY18 and FY19

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<th>FY18</th>
<th>FY19</th>
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<tr>
<td>Transition: Capability Delivery</td>
<td>68 (67%)</td>
<td>79 (68%)</td>
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<tr>
<td>Transition: Capability Enabler</td>
<td>25 (25%)</td>
<td>29 (25%)</td>
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<tr>
<td>No Transition</td>
<td>8 (8%)</td>
<td>8 (7%)</td>
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<td>Total</td>
<td>101</td>
<td>116</td>
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Transition success measured by delivery of capability to the Service, CCMD, or warfighter
Prototype or analysis that quickly explore emerging technologies to inform capability decisions without committing major resources

Examples:
- Risk reduction prototypes to quickly confirm technical viability or identify dead ends
- Rigorous analyses to inform technology roadmaps and investment decisions
- Modeling and simulation to assess feasibility without the cost of actual prototyping or experimentation
- Discovery and DoD assessment of emerging technologies in COTS or near-COTS that can meet military needs; Maintain Technology Agility
- Proof of Principle Experiments

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Success measured by achieving project’s completion according to planned cost, schedule, and performance
Transition Type: **No Transition**

Any project that does not meet criteria for transition as capability delivery or capability enabler

Examples:
- Project terminated for failure to meet program objectives at any milestone
- Project terminated when expected phase two partner funding becomes unavailable
- Project completes successfully, but user priorities have changed or requirements have evolved
- Proof of principle prototype completes successfully, but no transition partner immediately adopts prototype

<table>
<thead>
<tr>
<th>P&amp;E Results of Projects Ending in FY18 and FY19</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY18</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Transition: Capability Delivery</td>
</tr>
<tr>
<td>Transition: Capability Enabler</td>
</tr>
<tr>
<td>No Transition</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
</tr>
</tbody>
</table>
JCTD Trends & Lessons Learned (LL)
Better Execution = Better Capability Development

• **P&E Call Letter Submission Process**
  - Trend: Field confusion; Once size fits all is not working
  - LL: Early announce is good
  - LL: Separate Call Letters by PE to stress each program’s particulars

• **Bottom-Up and Top-Down Proposal Submission**
  - Trend: Increase of Orphan Projects w/out Advocacy
  - Trend: Proposals lack Technology Advancement towards developing NEW Warfighter Capabilities
  - Trend: JCTDs proposal viewed as a Service UFR
  - Trend: Lack of Jointness; viewed as Title-10 Service requirement
  - Trend: Unwanted Redundancy
  - LL: Follow the Tenants of Proposal Development
  - LL: Increase transparency; JMF and CrossPol efforts
  - LL: Stress both Operations & Technical Merit

• **Strategic, Operational, & Tactical Alignment**
  - Trend: Alignment is unclear; proposal is trying to do it all
  - LL: Pick One Primary and define clear/concise way

• **Implementation Directive: A signed agreement amongst Stakeholders**
  - Trend: Signed Late; No periodic review
  - LL: Slap the table during or shortly after Kick-Off
  - LL: Signed w/in 90-days of Kick-Off
  - LL: Review Annually w/ OEG members

• **Commitments-Obligations-Expenditures**
  - Trend: JCTD PE behind on OSD Comptroller Benchmarks; too much rework and time in moving funds; lack of unity of effort
  - Trend: Lagging open commitments; lack of expenditures reconciliation; increase in returned funds that have already expired
  - Trend: Congressional Marks and DWR Cuts as result
  - LL: TM assigned for all finical execution
  - LL: OE holds quarterly financial reconciliation briefed by TM

• **Programmatics (Cost-Schedule-Performance)**
  - Trend: Multiple OMs/IMT Members; LNOs serving as OMs are double funded
  - Trend: Lingering technical performance issues vice timely risk mitigations/corrections
  - Trend: Deliverables not iaw ID; Op-Demo/MUA is too late to identify technology/component deficiencies
  - LL: No such thing as a perfect JCTD Project—transparency is key
  - LL: Regular Technical reviews with IMT & Stakeholder technical team (qtrly or semi-annual)
  - LL: Annual/End of Phase review with Dir, JCTD and OEG membership

• **Phasing, Milestones and Deliverables**
  - Trend: Lack of Go / No Go Phasing aligned to specified deliverables and funding applied
  - LL: Proper phasing = better Risk mitigation/corrections
  - LL: Fail Early, Fail Cheap, & Fail Often
  - LL: Low Cost Enabler JCTDs is a good way to start higher risk efforts
Questions

DoD Research and Engineering Enterprise
https://www.CTO.mil/

Twitter
@DoDCTO
DD(P&S) Matrixed Execution

Program Execution

- Global Capabilities Program (GCP)
  - Foreign Comparative Test
  - Allied Prototyping Initiative
  - Forums & Events

- Software Prototyping & Strategy (SPS)
  - Policy and Directives
  - Software Prototyping & Development
  - Cyber Resiliency & TTXs

- Program Operations JCTD
  - Proposals & Deconfliction
  - Innovation Outreach
  - Forums & Events
  - Knowledge & Data Mgmt.

- Program Operations RDTO
  - PE & Program Execution
  - Red Teaming
  - IRAD Capture
  - CCMD and Service LNOs

- Program Integration Office
  - SAP Programs
  - Other Special Projects

- Joint / Combined Demonstrations Office
  - Joint Campaigns & Exercises
  - Standard Demo Platforms
  - Tech Assessments & MUAs
Contested Logistics
Purpose:

- Cross-pollinate on-going and planned Contested Logistics prototyping activities leveraging groundwork from, and aligned with, the JWC, JCCL, and Military Service concepts, where applicable
- Engage concept development and S&T communities simultaneously to ensure unity of effort

Method:

- P&S and JFIC solicit input via coordinated and complementary email requests
- Co-Chaired by P&S, JFIC, and JS/J4
- 1/2 - day in-person/virtual event with R&E, J4, and Service-level presentations and discussion
- Services share Contested Logistics capability gaps and projects with Joint applicability which prototyping can or will address, and which are aligned to the three JCCL Tasks;
  - Task One: Resilient, Integrated C2
  - Task Two: Assured Joint Power Projection
  - Task Three: Distributed Logistics in a Contested Environment

Endstate:

- Identify prototyping investment opportunities focused on finding the gaps, seams, and interdependencies in our Contested Logistics efforts
- Opportunities to realize prototyping efficiencies by shared investments and/or divesting duplicative activities
P&E’s objectivity, freedom to cross boundaries, and ability to take risks enables us to provide game-changing Joint mission capabilities to the Warfighter through four program elements (PEs)

- Joint Capability Technology Demonstration (JCTD)

- Defense Modernization and Prototyping (DM&P)
  - Emerging Capabilities Technology Development (ECTD)
  - Quick Reaction Special Projects (QRSP)
  - Time sensitive Target Defeat (TSTD)
  - Red Teaming (RT)

- Rapid Prototyping Program (RPP)

- DoD Rapid Prototyping Fund (DoD RPF)
Low Cost Project Pipeline (< $1.0M per yr)

- Proposals for low cost projects (<$1M/yr OSD funds) will be evaluated and approved through an accelerated process
  - Same call for proposals
  - Same fundamental steps
  - Same funding decision authority

- Uses 06/GS-15 Small Group Review to develop funding recommendations, rather than the Prototyping Senior Steering Group

- Participants include the DoD/Interagency prototyping community of interest, including the Military Services, CCMDs, Joint Staff, and ADs

- Small Group Review will meet quarterly to:
  - Deconflict proposals from ongoing work
  - Collect inputs on technical feasibility & programmatic rigor
  - Collect inputs on benefit to the warfighter
  - Monthly DD-P&S funding decision for selected low-cost projects

Low Cost Pipeline collects stakeholder inputs for real-time decision making
Source of U.S. High-Technology & Innovation?
Two prevailing points of view

Adam Smith—Free Market Model
- Thesis: Innovative high-technology in the U.S. *springs from the free-market principles*, free-wheeling entrepreneurs, and anti-statist political norms in our economy. The USG *harvests this high-technology for defense purposes, but contributes little to its creation*, other than providing a business-friendly environment.

Linda Weiss—National State Model
- Counter Thesis: Innovative high-technology in the U.S. *springs from deliberate engagement* between the “National Security State” (NSS) and the free-market, encouraged by *purposeful Government investment* to take advantage of anti-statist political & economic norms.

Linda Weiss, *America Inc.?*
Other Considerations during each PSA Turn

• Product differential features
  - Identify competing technologies and/or approaches?
  - Who is doing something similar, are you in discussions?

• External environment concerns
  - Contracting - has the contracting execution organization bought off on the extra work?
  - Environmental/social/treaties, etc., and other concerns? (Example: can the program be stalled out in domestic/international court or in the legislative branch?)

• Time to market
  - Will the technology be irrelevant by the end of the program? (Example: program presented has a time to market that is too slow, exceeds 36 months)

• Predicted fragility and adversary response
  - Resiliency (Example: cyber, physical, environmental, etc.)
  - Vulnerability to countermeasures (Example: easy to defeat?)
  - Adversary tactical and strategic reaction due to the program? (Examples: start an unwanted arms race, war, radically change their AOR defensive/offensive posture, etc.)

• Many Others...
# Metrics Matter

## Program Review Metric Assessment

<table>
<thead>
<tr>
<th>Metric</th>
<th>Rating Range</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>GREEN</td>
<td>Original cost or re-baselined cost deviation is less than 10%</td>
</tr>
<tr>
<td></td>
<td>YELLOW</td>
<td>Original cost or re-baselined cost deviation is between 10% - 15%</td>
</tr>
<tr>
<td></td>
<td>RED</td>
<td>Original cost or re-baselined cost deviation exceeds 15%</td>
</tr>
<tr>
<td><strong>Schedule</strong></td>
<td>GREEN</td>
<td>Original schedule or re-baselined schedule to meet next milestone has less than 25% deviation within the past 90-days</td>
</tr>
<tr>
<td></td>
<td>YELLOW</td>
<td>Original schedule or re-baselined schedule to meet next milestone has less than 50% deviation within the past 90-days</td>
</tr>
<tr>
<td></td>
<td>RED</td>
<td>Original schedule or re-baselined schedule to meet next milestone has more than 50% deviation within the past 90-days</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>GREEN</td>
<td>Performance goals/metrics meet or exceed stated objective or are within 25% of meeting or exceeding quantitative metrics</td>
</tr>
<tr>
<td></td>
<td>YELLOW</td>
<td>Performance goals/metrics are at risk of meeting stated objective or are within 25%-50% of meeting quantitative metrics</td>
</tr>
<tr>
<td></td>
<td>RED</td>
<td>Performance goals/metrics cannot meet stated objective without project restructuring.</td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>GREEN</td>
<td>Transition path(s) identified (e.g., POR, GSA, residuals, etc.)</td>
</tr>
<tr>
<td></td>
<td>YELLOW</td>
<td>Transition path(s)/funds negotiations are underway.</td>
</tr>
<tr>
<td></td>
<td>RED</td>
<td>No transition path(s)/funds identified</td>
</tr>
</tbody>
</table>
## Metrics Matter

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>Program Review Metric Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
<td>Rating Range</td>
</tr>
<tr>
<td>Return on Investment (ROI)</td>
<td>GREEN</td>
</tr>
<tr>
<td>OSD vs. Partner on dashboard</td>
<td>YELLOW</td>
</tr>
<tr>
<td>Relevance</td>
<td>RED</td>
</tr>
<tr>
<td>-CCMD</td>
<td>GREEN</td>
</tr>
<tr>
<td>-CGA</td>
<td>YELLOW</td>
</tr>
<tr>
<td>-ADs</td>
<td>RED</td>
</tr>
<tr>
<td>-Product Lines</td>
<td>GREEN</td>
</tr>
<tr>
<td>-BAA</td>
<td>YELLOW</td>
</tr>
<tr>
<td>-JS Mission Areas</td>
<td>RED</td>
</tr>
<tr>
<td>Timeliness</td>
<td>GREEN</td>
</tr>
<tr>
<td>Innovation</td>
<td>Revolutionary - 3</td>
</tr>
<tr>
<td>*Display sum of each category on dashboard</td>
<td>Evolutionary - 2</td>
</tr>
<tr>
<td></td>
<td>Sustainment - 1</td>
</tr>
</tbody>
</table>