

An Assessment of Early Competitive Prototyping for Major Defense Acquisition Programs

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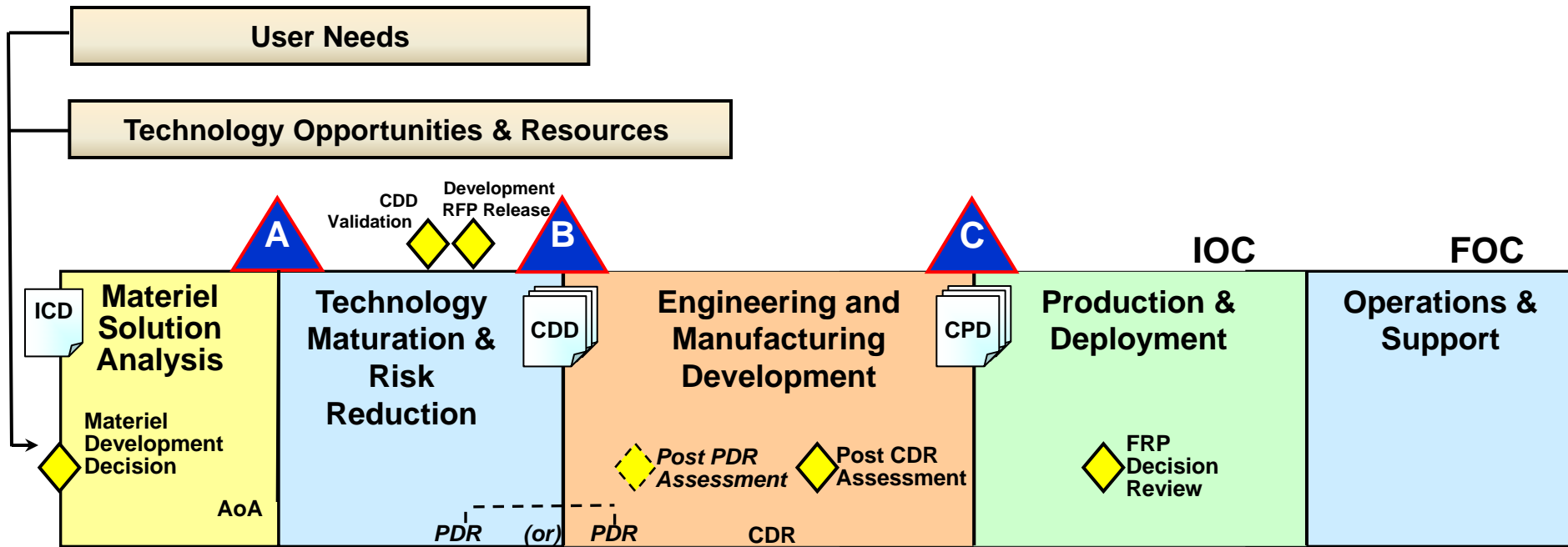
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WSARA and Prototyping

- Competitive prototyping of systems or critical subsystems before Milestone B approval
- If competitive prototyping is waived by MDA, a prototype must still be produced before MS B



Defense Acquisition Framework



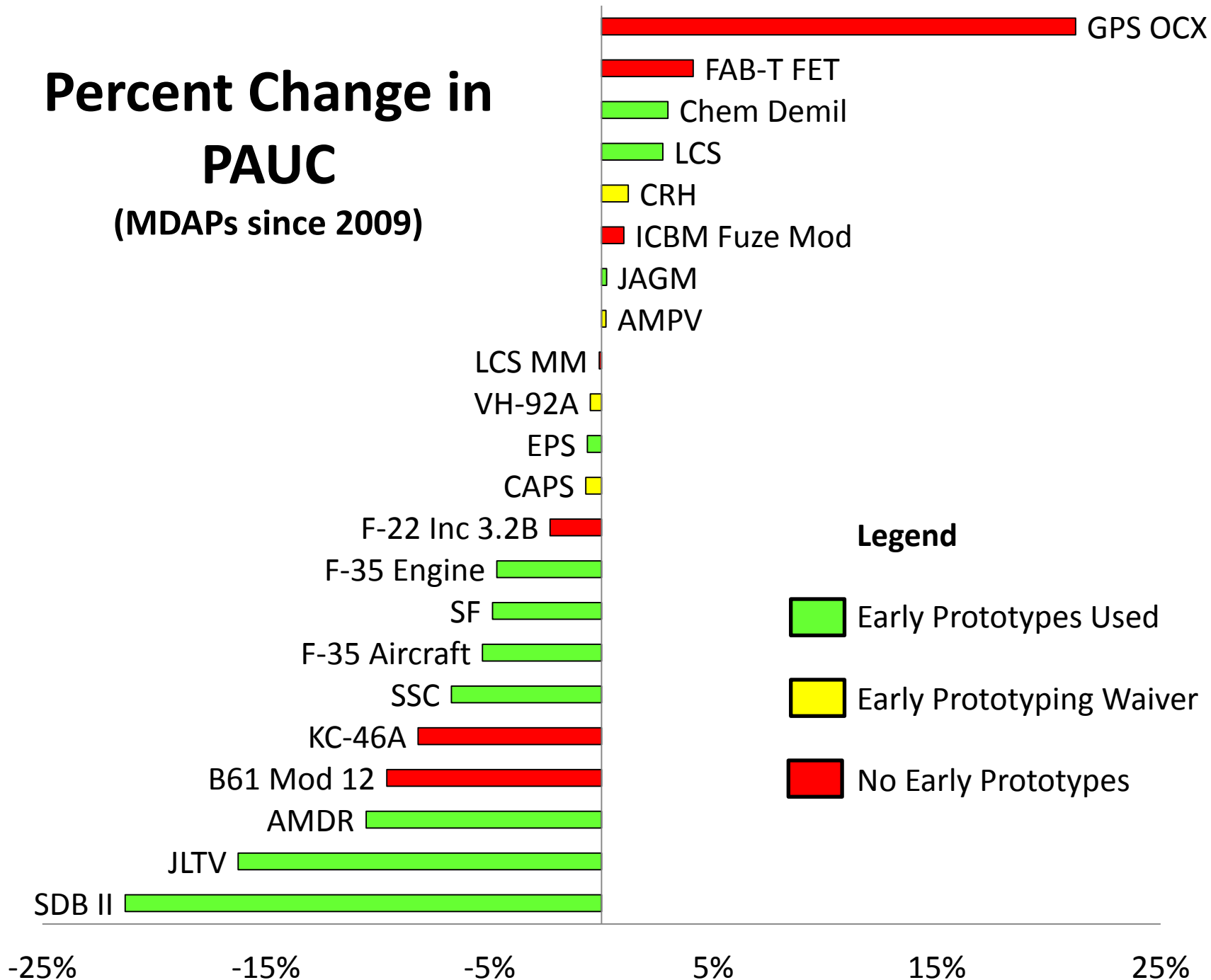
**Competitive
Prototyping**

**Program Acquisition
Unit Cost (PAUC)**

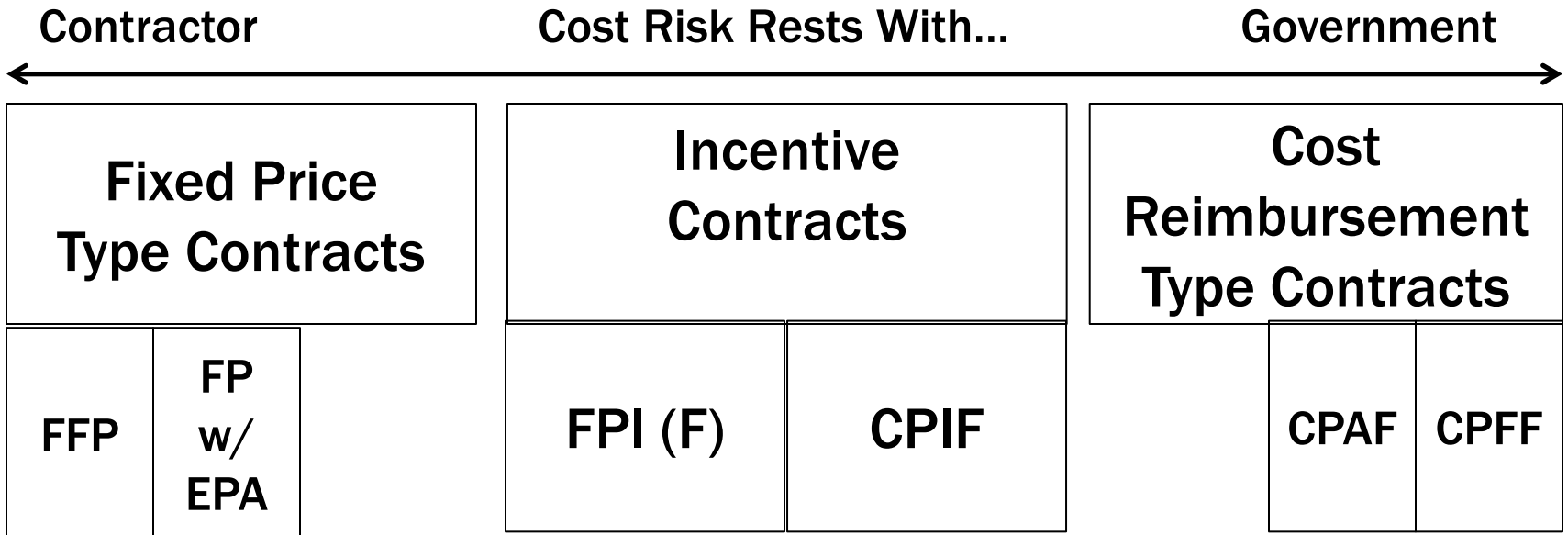
Pre-MADPs and MDAPs Subject to Statutory Prototyping Since 2009

Waiver	No Prototyping	Prototyping
• AMPV	• B61 Mod 12 LEP TKA	• AMDR
• B-2 DMS Mod*	• F-22 Inc 3.2B Mod	• Chem Demil-ACWA
• CRH	• FAB-T FET	• EPS
• EPS CAPS	• GPS OCX	• F-35 Aircraft
• F-15 EPAWSS*	• ICBM Fuze Mod	• F-35 Engine
• IFPC Inc 2 Blk 1	• KC-46A	• JAGM
• T-AO (X)*	• LCS MM	• JLTV
• VH-92A		• LCS
		• NGJ*
		• SDB II
		• SF
		• SSC
pre-MDAP		• 3DELRR

Percent Change in PAUC (MDAPs since 2009)



EMD Phase Contract Types



JLTV

SDB II

LCS

SSC

EPS

F-35 Aircraft

JAGM

SF

3DELRR

AMDR

F-35 Engine

LCS MM

CRH

AMPV

Chem Demil

Early Prototypes Used



Early Prototyping Waiver



No Early Prototypes



VH-92A

EPS CAPS

GPS OCX

B61 Mod 12 LEP TKA

B-2 DMS Mod

KC-46A

F-22 Inc 3.2B Mod

ICBM Fuze Mod

Waiver of Early Prototyping (8 Programs)

- Minimal changes in PAUC
- Cost Reimbursement EMD Contracts – 3
Fixed Price EMD Contracts – 2
- Rationale behind waivers
- GAO's Assessments:
 - Some waivers supported by Acquisition Strategy
 - Some waivers lacked prototyping alternatives or failed to dollarize prototyping benefits
 - Schedule impacts not quantified in dollars
 - Business Case Analyses not posted with assessments

Waiver
• AMPV
• B-2 DMS Mod*
• CRH
• EPS CAPS
• F-15 EPAWSS*
• IFPC Inc 2 Blk 1
• T-AO (X)*
• VH-92A
*pre-MDAP

No Early Prototyping (7 Programs)

- Reductions in PAUC – 4 programs
- Increases in PAUC – 3 programs
- Cost Reimbursement EMD Contracts – 5
- Fixed Price EMD Contract - 1

No Prototyping
• B61 Mod 12 LEP TKA
• F-22 Inc 3.2B Mod
• FAB-T FET
• GPS OCX
• ICBM Fuze Mod
• KC-46A
• LCS MM

- All 7 programs bypassed TMRR, starting in EMD Phase
- Software Development and Systems Integration not considered as reasons for Early Prototyping

Early Prototyping (13 Programs)

- Reductions in PAUC – 8 programs
- Increases in PAUC – 3 programs
- Fixed Price EMD Contracts – 5
- Cost Reimbursement EMD Contracts – 5
- Types of prototypes used

Prototyping
• AMDR
• Chem Demil-ACWA
• EPS
• F-35 Aircraft
• F-35 Engine
• JAGM
• JLTV
• LCS
• NGJ*
• SDB II
• SF
• SSC
• 3DELRR*
* pre-MDAP

Joint Lightweight Tactical Vehicle (JLTV)



USA / USMC

Contract Type

TD Contract Costs

Requirements

Tech Dev Phase

Prelim Design Rev

TRL / MRL

BAE Systems

Various

\$62.9 M

AM General/GDLS

Various

\$61.3 M

draft CDD

27 months

June - July 2009

Lockheed Martin

CPFF

\$53.4 M

5 (underbody) / TMRR protoypes built on assembly line

Small Diameter Bomb (SDB) II



USAF / USN

Boeing / Lockheed

Raytheon

Contract Type

CPFF

CPFF

TD Contract Costs

\$161.4 M

\$161.4 M

Requirements

validated CDD, June 2009; 5 KPPs

Tech Dev Phase

42 months

Critical Design Rev

within 6 months of MS B (June 2010)

TRL / MRL (at MS B)

6 / 6 (Program Office Estimates)

Littoral Combat Ship (LCS)



USN	General Dynamics	Lockheed Martin
Contract Type	FPI	FPI
TD Contract Costs	\$575 M	\$537 M
Requirements	validated CDD, June 2008; 10 KPPs	
Tech Dev Phase	72 months	
Milestone B	Feb 2011	
TRL (at MS B)	? (integration w/mission packages) / ? (seaframe)	

Cyclic Use of Prototyping

- Pre - WW II



- “Fly-Before-Buy”



- Packard Commission



Rethink and Relearn Prototyping

- How to develop a sound business case
- Multiple competition-sensitive contracts
- Defending cost of multiple prototypes
- Understanding how ATDs and JCTDs fit in
- Competitive prototyping of critical subsystems