



***CRITICAL THINKING.  
SOLUTIONS DELIVERED.***

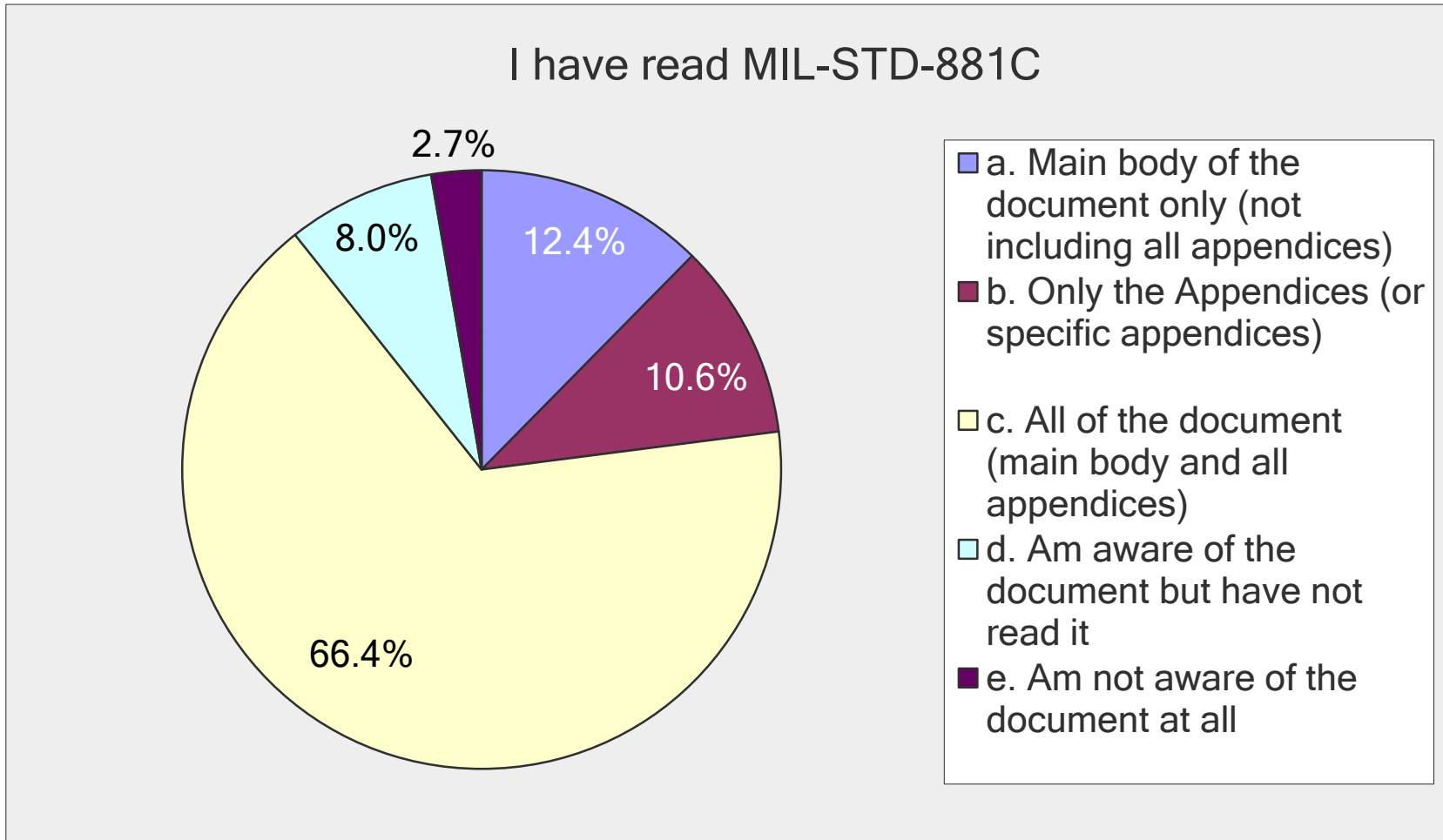
# Work Breakdown Structures for Defense Materiel Items (MIL-STD-881C)

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26 August 2015

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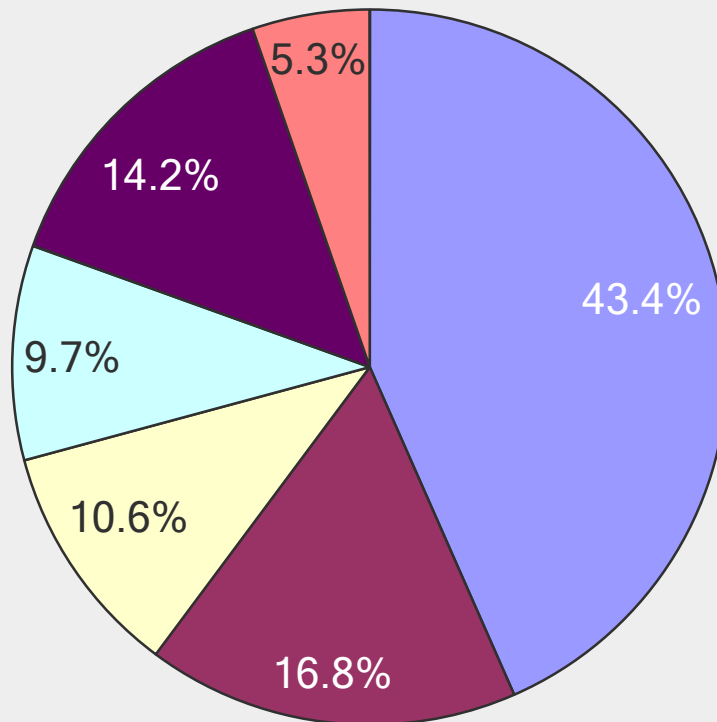
# Q2: I have read MIL-STD-881C



# Q3: I have used MIL-STD-881C (all or some portion of it)



I have used MIL-STD-881C (all or some portion of it)

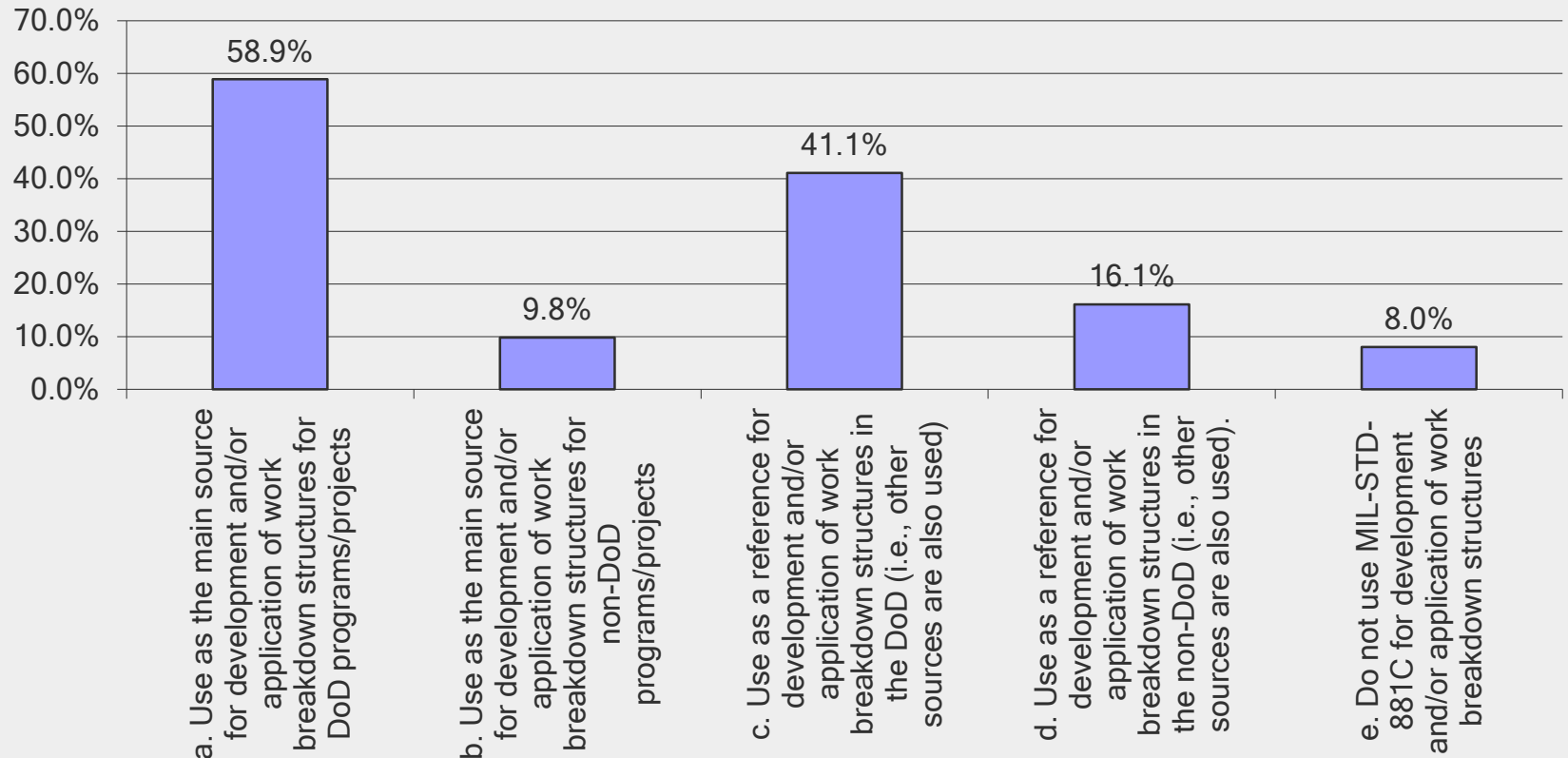


- a. Within the last 30 days
- b. Within the last 3 months
- c. Within the last 6 months
- d. Within the last year
- e. It has been a year or longer
- f. Never used MIL-STD-881C

# Q4: Which of the following best describes your use of MIL-STD-881C?



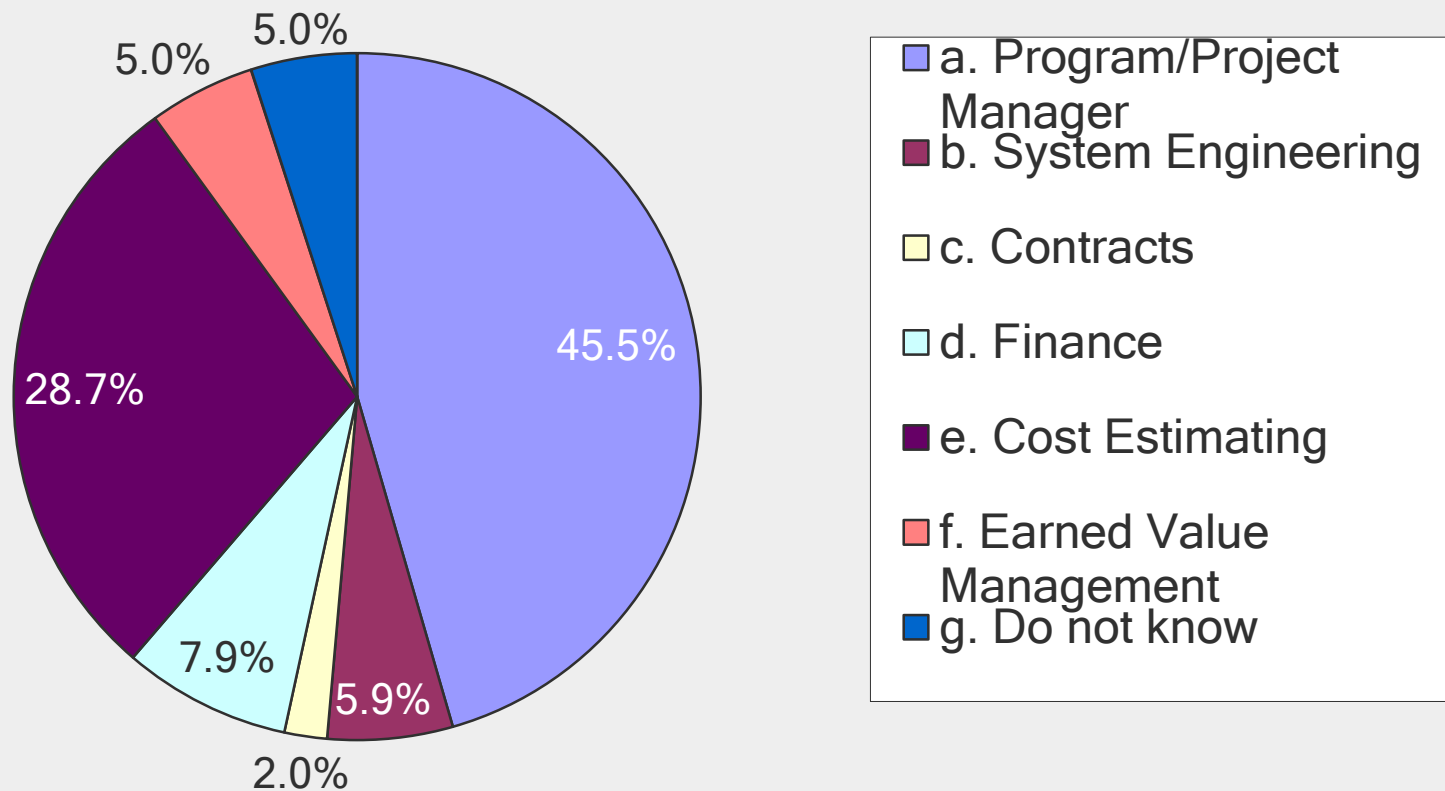
Which of the following best describes your use of MIL-STD-881C? (Choose all that apply)



# Q5: Within your program/project, what organization is the owner of the WBS?



Within your program/project, what organization is the owner of the WBS?



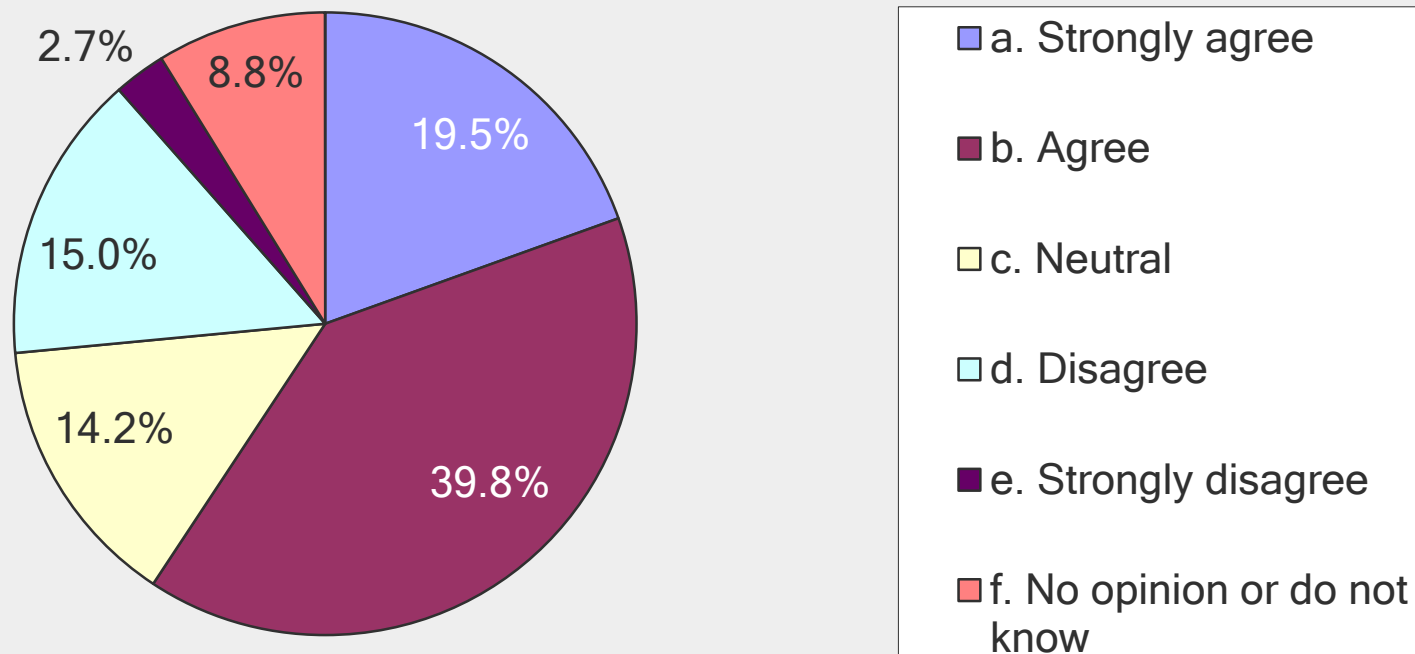
## Q8: Please explain why MIL-STD is not useful in understanding the development of an effective WBS

- No Operations and Sustainment
- Need better production environment description
- System of Systems/Family of Systems/Family of Family better definition
- No direction on multiple configurations (variants)
  - Issues with allocation of common elements across variants
- Relationship to CLIN/SLIN
- Contractor systems limited at lower levels
- IT and common element appendices not effective
- Post MS C updates for software
- Not useful for IDIQ contracts
- Services WBS non-existent
- Agile development does not fit

Q9: The content provided in the appendices of 881C is useful in describing and implementing an effective WBS for my program/project.



The content provided in the appendices of MIL-STD-881C is useful in describing and implementing an effective WBS for my program/project.



Q11: If you answered Q9 as “Disagree” or “Strongly Disagree” please explain why it is not useful in describing and implementing and effective WBS (respond by WBS Appendix)

- Needs Operations and Sustainment
- More industry education
- Needs to stress that IMS does not have to be aligned by the WBS,
  - Particularly in a Production phase
  - Should be a way to sort it by WBS for cost reporting purposes.
- Needs work to support Agile development
- WBS paragraph to element numbering confusing
- Appendix K (MAIS) needs work
- More discussion on family of vehicles and how common elements are applied
- Not all programs apply 881C consistently
- Relevancy of “Data” Element
- Overly product-oriented
- Separate small missiles vs. strategic missiles



Q13: List the product, component, subassembly or military end item for any DoD weapon system platform that you feel deserves its own 881C appendix

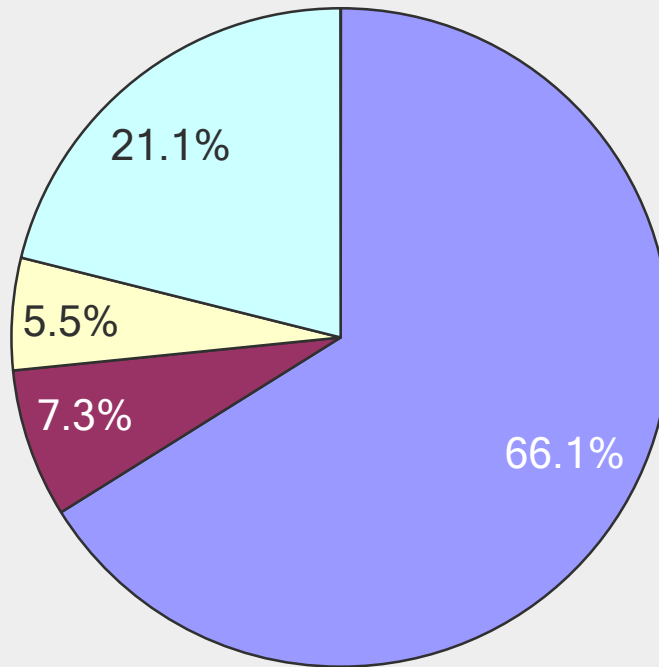


- O&S/O&M
- MAIS programs (Appendix K improved)
- Training/Simulation
- Radars (electronics specific)
- Hypersonic weapons
- Enterprise Resource Planning systems (Appendix K improved)
- Decommissioning/Disposal
- Propulsion systems
- Interim/long term organic and contractor support
- Ground stations for Space and other areas

# Q14: Is the WBS on your program/project typically product-oriented as defined in the MIL-STD-881C?



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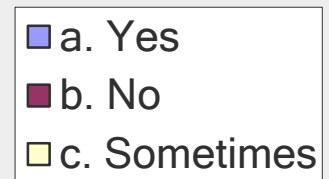
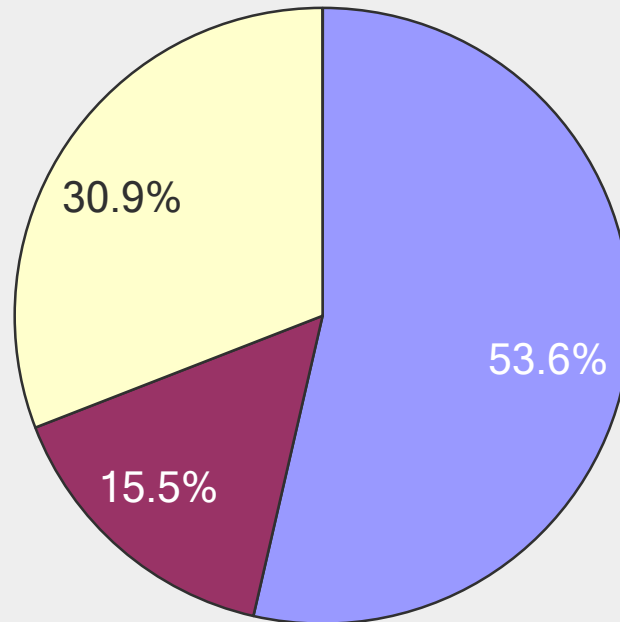


- a. Yes
- b. No
- c. Other (Please describe - e.g., process, task, functional, organizational, module, etc.)
- d. Mixed (i.e., Product and other)

Q15: Does the WBS product orientation on your program/project remain the same across each acquisition phase (i.e., development phase to production phase, etc.)?



Does the WBS product orientation on your program/project remain the same across each acquisition phase (i.e., development phase to production phase, etc.)?



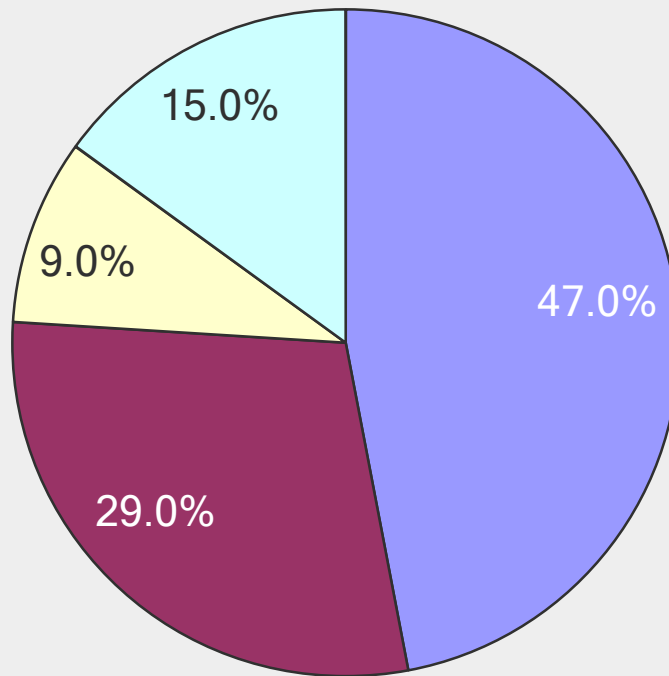
Q16: If you answered question 15 either “No” or “Sometimes” please explain why.

- Diverse set of major end items causes difficulty
  - e.g., Navigation/sensor on-board vs. ground radar
- Use of different WBS for scheduling
- Issues with LRIP programs – particularly with EVM reporting
- USG guidance conflicts over acquisition phase years
- Elements do not appear in each phase
  - Development expansion vs. production contraction
  - New items in production not in development
  - Changes in developer
- Efforts being conducted within each phase differ and carrying blank elements for the sole purpose of having the WBS the same
  - Pointless and wasteful
  - Giving elements 'fancy' names simply in an attempt to make them cross phases (be on more than phase) - ridiculous and confusing

# Q17: How do you apply the MIL-STD-881C in the production phase of the program/project?



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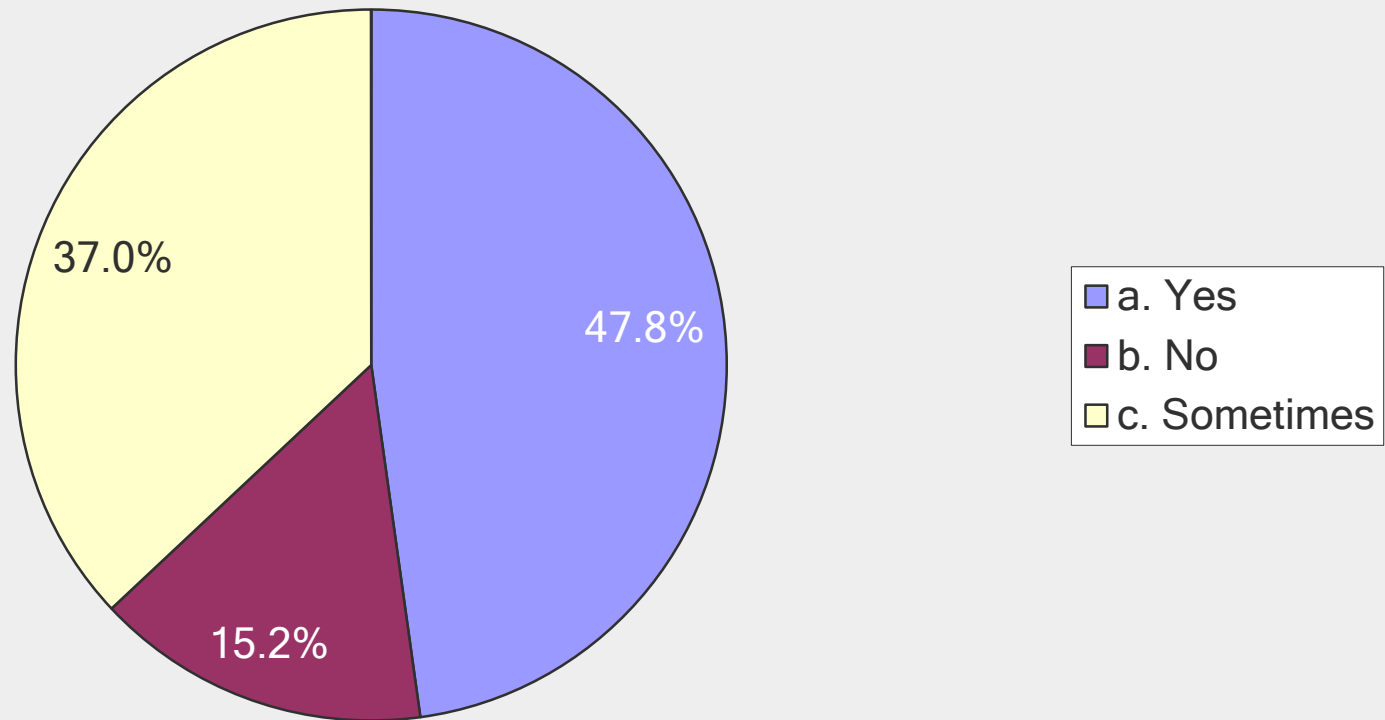


- a. Same as in the development phase of the program/project
- b. Same as in the development phase but generally at a higher level of the WBS
- c. Different WBS from the development phase: (please describe)
- d. Do not use a WBS in the production phase

# Q18: Does MIL-STD-881C work with agile development efforts?



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# Q19: If you answered question 18 either “No” or “Sometimes” please explain why

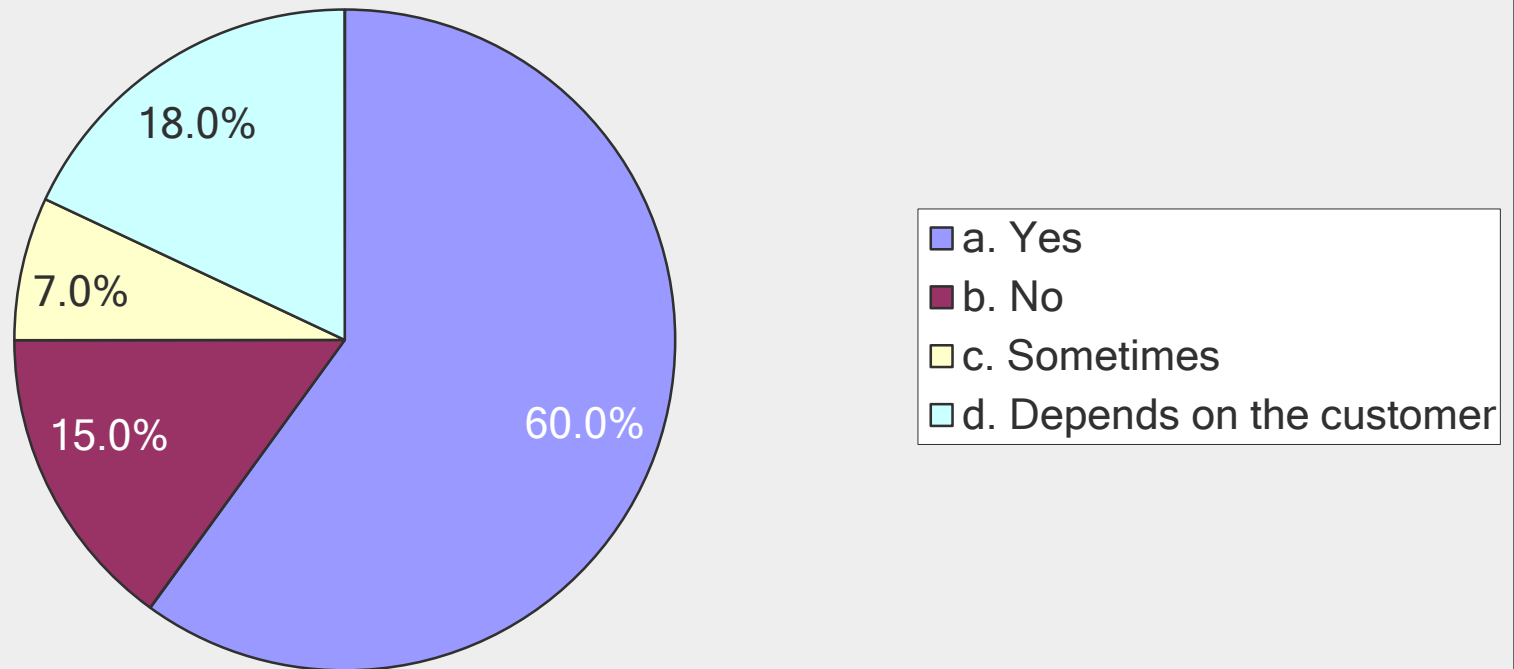


- Many don't understand “Agile”
- Can be a struggle/not flexible enough
- In order to be flexible to accommodate evolving development efforts within a contract one must allow for expansion within the WBS which might cause one to not to adhere to the numerical structures in the Appendices.
- Depends on what type of agile planning you are doing
  - Software is typically agile
  - Cross-product teams make the WBS a bit more challenging
- Depends on the development effort and what the WBS will be used for
  - If CSDR or EVM reporting, it is a little harder, especially since it takes so long to get approvals.
- WBS process with respect to EVM/cost estimating is not set up properly to handle agile
- Include more description/guidance on evolutionary development
- End item is not what was envisioned at beginning – product orientation fails
- 881 drives to too low level in PMP – forces “HW/SW” breakout
- Software needs separate guidance in MIL-STD

# Q20: Do you typically manage your program/project to the same WBS that you use to report to your customer?



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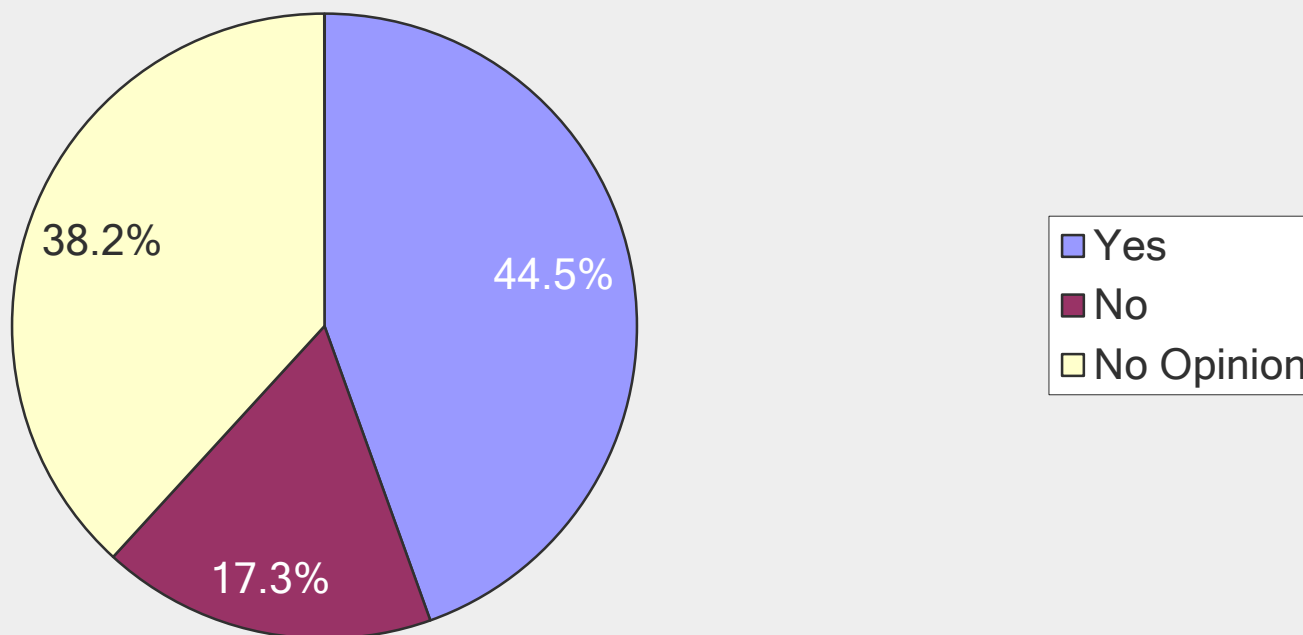




# Q22: Should the 881C appendices be permitted to contain non-product oriented WBS elements beyond those current captured in Appendix L: Common Elements?



Should the MIL-STD-881C WBS appendices be permitted to contain non-product oriented WBS elements beyond those current captured in Appendix L: Common Elements?



Q24: In your opinion, what is the appropriate level for the WBS to be consistent with IPMR-Format 1 and the CSDR Plan?

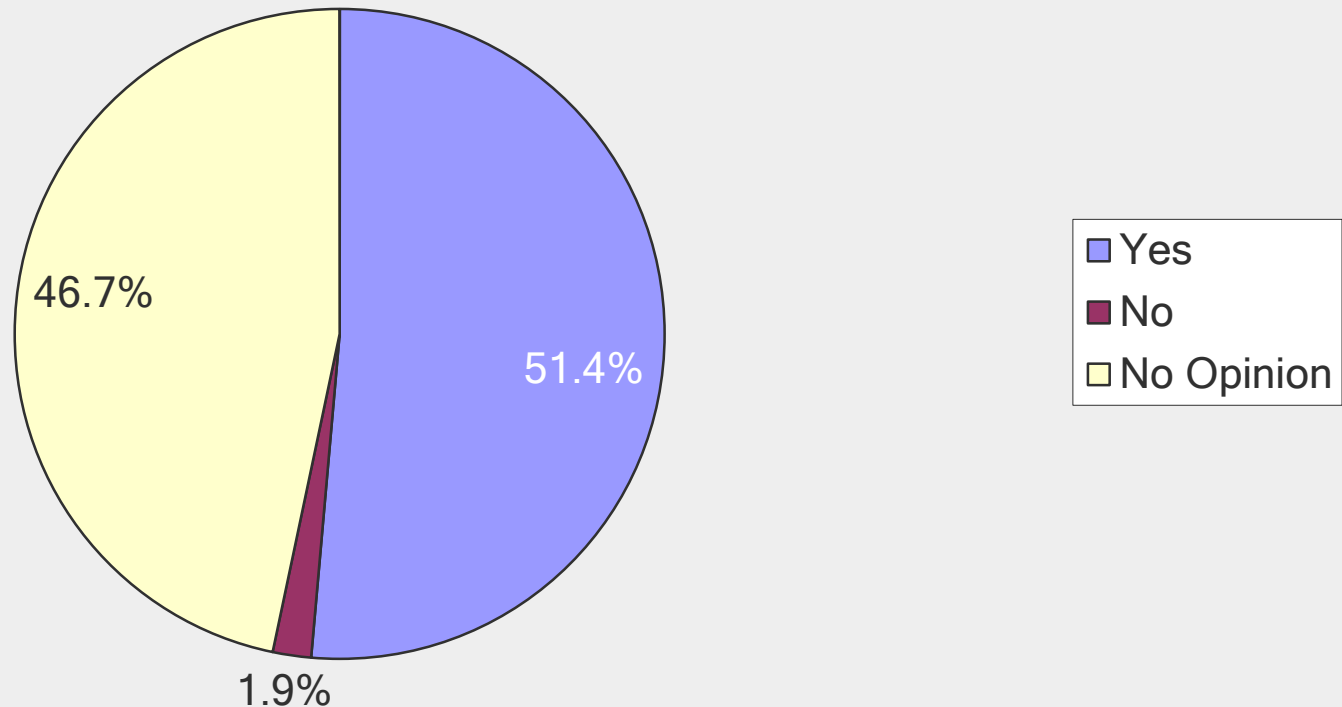


- Large majority responded level 3 or 4
  - Lower for high risk elements
- Many said it should be flexible depending on the program
- Others stated – the same no matter what level (at the control account)

Q25: Is comparability and reconciliation of the IPMR Format 1 and the DD Form 1921 Cost Data Summary Report, each based on the same MIL-STD-881C WBS appendix to level 3, achievable?



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# Q26: Regardless of 881C, in your job what issues have you encountered in developing and/or implementing a WBS? (e.g., contract issues, supplier issues, customer issues, definition issues, etc.)



- MIL-STD not used enough – weak/inconsistent WBS
- Customer and supplier request different WBS
- Inconsistent levels of reporting
- Understanding the approach of Appendix B integrated into other appendices
- Having N/As required on CSDR reports
- More requirements driving to low in the WBS for all elements
- RFP/Bid WBS not product based
- Historical data not at the level of product WBS
- Lack of flexibility to not allow non-product items below reporting level
- Lack of consistency to Operations and Support costs
- Integration of contract mods with segregation of cost into existing WBS
- Length of coordination time for WBS approval
- Cost of major subcontractors in Material WBS
- Identifying recurring vs. non-recurring costs within the WBS
- Better education on the WBS
- Using CES for MAIS program based on 1995 Economic Analysis Guide – MIL-STD not consistent
- Customer CLIN segregation not being product oriented
- Resistance at OSD to differences between R&D and investment WBS
- Contractors not adhering to MIL-STD
- Lack of a DID
- WBS numbering system (with blanks) directed in MIL-STD not well-liked
- No services/sustainment WBS – forcing to use a WBS in the appendix which is not appropriate
- Difference between WBS and CES
- Color of money/phase application

# Trending Issues

- Revise Appendix K (IT Systems) or develop a MAIS/ERP Appendix
- Desire to include O&S and more definition on sustainment
- Need to continue to educate Government and Industry on the use of the MIL-STD-881C
- Differing reporting levels DCARC vs. PARCA and Customer management
- Expanding definitions to ensure consistency
- Understanding how to apply in Production environment (MRP System based?)
- Applying to Agile development environment

# MIL-STD 881C IMPLEMENTATION

# Implementation Requirements

- Mandatory procedures that apply to programs subject to DoD acquisition policy (DoDI 5000.02) and the suppliers that support those programs
  - ACAT IC, ID – Major Defense Acquisition Programs (MDAP)
  - ACAT IA – Major Automated Information System (MAIS)
  - ACAT II
  - ACAT III
- Must be implemented on all new contracts
  - Not required to change ongoing contracts to new structure
  - Should be implemented on new contract of current system
- Required for all major weapon systems – including ships

# DID Language – WBS Level

## 2005 CPR DID:

- The level of detail to be reported in Format 1 normally will be at level three of the CWBS, but lower levels may be specified for high-cost or high risk items.
- The Gov and the contractor shall periodically review and adjust as necessary CWBS reporting levels on Format 1 to ensure they continue to provide appropriate visibility without requiring excessive information.
- If there is a significant problem at a lower level, detailed reporting for that CWBS element may be required until the problem is resolved.

## 2012 IPMR DID:

- Change to from MILHDBK to MILSTD.
- The submission of Format 1 data shall utilize a product-oriented WBS consistent with MIL-STD-881 (current version at time of award); Format 5 to only reflect Format 1 variances.
- UN/CEFACT EVM data at the control account level; must follow Format 1 WBS.
- WBS levels below MIL-STD-881 are defined by the contractor and reported in accordance with the DoD Cost XML Guideline.



# Definition Changes to Reflect Technology



- Most appendices have been restructured to account for technology changes and integration changes

## MIL-HDBK 881A

Missile System	Air Vehicle	Propulsion (Stages 1...n] Payload Airframe Reentry System Post Boost System Guidance and Control Ordnance Initiation Set Airborne Test Equipment Airborne Training Equipment Auxiliary Equipment Integration, Assembly, Test and Checkout
	Command and Launch	Surveillance, Identification and Tracking Sensors Launch and Guidance Control Communications Command and Launch Applications Software Command and Launch System Software Launcher Equipment Auxiliary Equipment Booster Adapter

## MIL-STD 881C

Missile System	Air Vehicle	Airframe Airframe Integration, Assembly, Test and Checkout Primary Structure Secondary Structure Aero-Structures Other Airframe Components 1...n (Specify) Propulsion Subsystem (1...n) Specify Propulsion Integration, Assembly, Test and Checkout Motor/Engine (Specify) Thrust Vector Actuation Attitude Control System Fuel/Oxidizer Liquid Management Arm/Fire Device Flight Termination/Mission Termination Propulsion Software Release 1...n Other Propulsion Subsystems 1...n (Specify)
	Command and Launch	Power and Distribution Power and Distribution Integration, Assembly, Test and Checkout Primary Power Power Conditioning Electronics Distribution Harness Power and Distribution Software Release 1...n Other Power and Distribution Subsystems 1...n (Specify)
		Guidance Guidance Integration, Assembly, Test and Checkout Dome Assembly Seeker Assemblies Guidance Software Release 1...n Other Guidance Subsystems 1...n (Specify)
		Navigation Navigation Integration, Assembly, Test and Checkout Sensor Assemblies Navigation Software Release 1...n (Specify) Other Navigation Subsystems 1...n (Specify)



# Flexibility with the WBS

- Added “other” elements to account for changes in configuration or new technology that is not defined within the MIL-STD at lowest level

Surface Vehicle System

Primary Vehicle

Primary Vehicle Integration, Assembly, Test and Checkout

Hull/Frame/Body/Cab

System Survivability

Turret Assembly

Suspension/Steering

Vehicle Electronics

Power Package/Drive Train

Auxiliary Automotive

Fire Control

Armament

Automatic Ammunition Handling

Navigation and Remote Piloting

Special Equipment

Communications

~~Primary Vehicle Software Release 1...n~~

Other Vehicle Subsystems 1...n (Specify)

# What to do when you cannot find a WBS?



- If no WBS exists, use Appendix B – Electronics Systems--- provides generic approach to product oriented WBS

## Electronic System

Prime Mission Product (PMP) 1...n (Specify)

PMP Subsystem 1...n (Specify)

PMP Subsystem Hardware 1...n

PMP Subsystem Software Release 1...n

Subsystem Integration, Assembly, Test and Checkout

PMP Software Release 1...n (Specify)

Software Product Engineering

Computer Software Configuration Item (CSCI) 1...n

Subsystem Integration, Assembly, Test and Checkout

PMP Integration, Assembly, Test and Checkout

Platform Integration, Assembly, Test and Checkout

# Imbedded SW vs. Stand Alone SW

- Eliminated Application and System Software – only Software due to how software is developed
- Changed definitions for embedded Software in Appendix B

## MIL-HDBK 881A

### LEVEL 4

Build 1...n (Specify names)

Integration, Assembly, Test and Checkout

### LEVEL 5

CSCI 1...n (Specify names)

CSCI to CSCI Integration and Checkout

## MIL-STD 881C

### LEVEL X

PMP Subsystem Hardware 1...n (Specify)

PMP Subsystem Software Release 1...n (Specify)

Subsystem Integration, Assembly, Test and Checkout

### LEVEL Y

Software Product Engineering (defined per 4.2.1.2.1)

Computer Software Configuration Item (CSCI) 1...n (defined per 4.2.1.2.2)

Subsystem Integration, Assembly, Test and checkout (defined per 4.2.1.2.3)

# Embedded SW vs. Stand Alone SW

- Created AIS Work Breakdown Structure to support Business Systems, ERP Systems or any Software Intensive System

Automated Information System (AIS)

Automated Information System Prime Mission Product Release/Increment X

Custom Application Software 1...n (Specify)

Subsystem Hardware

Subsystem Software CSCI 1...n (Specify)

Subsystem Software Integration, Assembly, Test and Checkout

Enterprise Service Element 1...n (Specify)

Enterprise Service Element Hardware

Enterprise Service Element Software CSCI 1...n (Specify)

Enterprise Service Element Integration, Assembly, Test and Checkout

Enterprise Information System 1...n (Specify)

Business Area Hardware

Business Area Software CSCI 1...n (Specify)

Business Area Integration, Assembly, Test and Checkout

External System Interface Development 1...n (Specify)

External System Interface Hardware

External System Interface Software CSCI 1...n (Specify)

External System Interface Integration, Assembly, Test and Checkout

AIS Platform Hardware

System Level Integration



# Sustainment Support

## ■ Added common element for sustainment activities – Interim Contractor Support

L.3.9.5 Sustainment/Interim Contractor Support. The complex of equipment (hardware/software), data, and services required to operate, maintain, support and modernize prime mission product of existing operational systems done before the Material Support Date (MSD).

Includes, for example:

- a. Prime Mission Product (PMP) maintenance and modernization. The cost for this element includes maintenance and modernization (including the development and production) of existing, operational systems. It excludes the development and production of the original prime mission product.
- b. Support functions required to maintain and modernize the system, such as sustaining engineering, program management, logistics support, and supply chain management
- c. Test and evaluation for system and subsystem modifications
- d. Replacement of common and peculiar support equipment
- e. Replacement of repairable items
- f. Operational, maintenance and other personnel required at the operational unit level
- g. Unit operations costs, including operating material and support services at the operating unit
- h. Installation and personnel support functions in support of the unit level manpower

# Basics of 1...n Construct

## Related set of elements

MIL-STD 881C

WBS Element Code	WBS Element Name
1.0	F-51 Fighter
1.1	Air Vehicle
...	...
1.1.7	Furnishings and Equipment
1.1.8	Air Vehicle Software Release 1...n
1.1.9	Air Vehicle Integration, Assembly, Test, and Checkout

WBS Implementation

WBS Element Code	WBS Element Name
1.0	F-51 Fighter
1.1	Air Vehicle
...	...
1.1.7	Furnishings and Equipment
1.1.8	Air Vehicle Software Releases
1.1.8.1	Air Vehicle Software Release 1
1.1.8.2	Air Vehicle Software Release 2
1.1.8.3	Air Vehicle Software Release 3
1.1.9	Air Vehicle Integration, Assembly, Test, and Checkout

## Independent components

MIL-STD 881C

WBS Element Code	WBS Element Name
1.0	F-51 Fighter
1.1	Air Vehicle
1.1.1	Airframe
1.1.1.1	Airframe Integration, Assembly, Test and Checkout
1.1.1.2	Fuselage
1.1.1.3	Wing
1.1.1.4	Empennage
1.1.1.5	Nacelle
1.1.1.6	Other Airframe Components 1...n (Specify)
1.1.2	Propulsion

WBS Implementation

WBS Element Code	WBS Element Name
1.0	F-51 Fighter
1.1	Air Vehicle
1.1.1	Airframe
1.1.1.1	Airframe Integration, Assembly, Test and Checkout
1.1.1.2	Fuselage
1.1.1.3	Wing
1.1.1.4	Empennage
1.1.1.5	Nacelle
1.1.1.6	Stealth Special Airframe Part A
1.1.1.7	Stealth Special Airframe Part B
1.1.2	Propulsion