Think of the WBS as your "project recipe." A recipe tells you everything you need to know to create a delicious meal-what ingredients and exactly how much of each to use, how to combine all the ingredients, and exactly how and how long to cook your food to perfection.

Likewise, a well-crafted WBS ensures that your team shares a common understanding of the scope of the work across the entire project, and each exact element and effort to reach that end product/deliverable.

The WBS assists project leaders, participants, and stakeholders in the development of a clear vision of the end products or outcomes to be produced by the project.

It provides the framework for all deliverables throughout the project life cycle.

Design: the WBS provides a graphical representation or textual outline of the

project scope. Some of the main roles the WBS plays in supporting clarity

for project definition are that it:

Decomposes: the overall project scope into clearly defined deliverables.

Defines: the scope of the project in terms that the stakeholders can

understand.

Provides: a structure for organizing information regarding the project's

progress, status, and performance.

Supports: tracking of risks to assist the project manager in identifying and

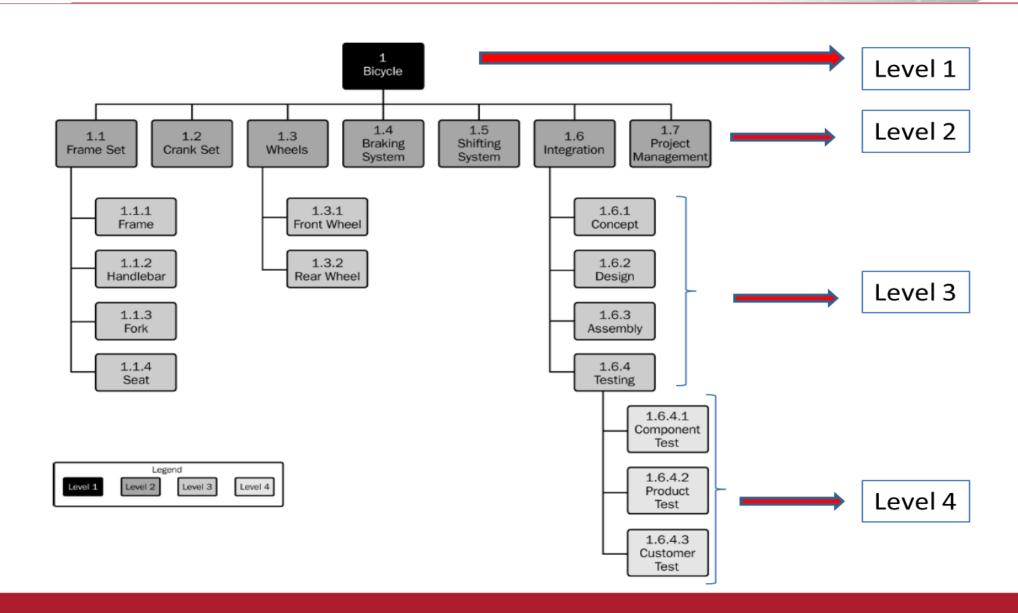
implementing necessary responses.



The deliverables must be captured effectively by the project team as part of the WBS. If it is not part of the WBS, it is not part of the project. Very simple, right?

Unfortunately, it is not that easy and a lot of projects have what is called "scope creep" resulting in projects that are over budget and behind schedule.

## WBS- Example

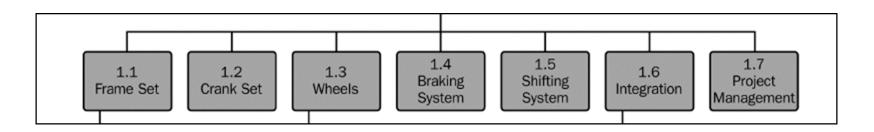


## WBS- Example

As you can see, the first level describes the product we want to achieve once the project is complete.

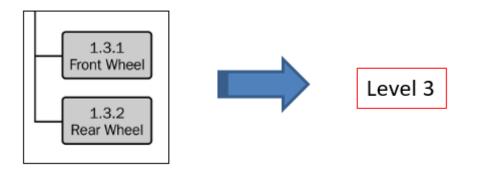
Now the team can start decomposing the product into smaller, more manageable components.

This is what the level 2 is showing below:



If we take the component called "Wheels" for example, we may want to break it down into several pieces. However, the team has to decide how much detail the work really requires.

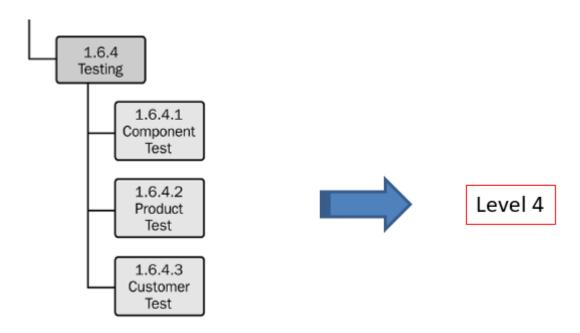
For this example, we can just break this level into two pieces:



The bicycle as a product has only two wheels and from a project management standpoint, this is enough for the team.

## WBS-Example

Finally, there could be a component that needs more details for other reasons. In our example, the team decides to bring even more detail to the component called "Testing". Based on the project's needs, there could be a reason to add three more work packages as you can see in the following figure:



### WBS-Example

1. Bicycle-Work-Breakdown-Structure (WBS) 1.1. Bicycle Product (Deliverable) Scope 1.1.1. Frame-Set 1.1.1.1. Frame 1.1.1.2. Handlebar 1.1.1.3. Fork 1.1.1.4. Seat 1.1.2. Crank-Set 1.1.2.1. Pedals 1.1.2.2. Cranks 1.1.2.3. Bearing Assembly 1.1.3. Wheels 1.1.3.1. Front Wheel Assembly Front-Rim 1.1.3.1.1. 1.1.3.1.2. Spokes 1.1.3.1.3. Hub 1.1.3.2. Rear Wheel Assembly 1.1.3.2.1. Rear-Rim 1.1.3.2.2. Spokes 1.1.3.2.3. Hub 1.1.4. Braking System 1.1.4.1. Front Brakes 1.1.4.2. Rear Brakes 1.1.5. Shifting System 1.1.5.1. Front Gear Shift System 1.1.5.2. Rear Gear Shift System 1.2. Supporting Project-Scope 1.2.1. Project Management 1.2.2. Safety 1.2.3. Systems Engineering 1.2.3.1. Integration 1.2.3.2. Testing

Very important key points to keep in mind while developing a WBS:

- 1. The WBS is created with the help of the team.
- 2. The first level is completed before the project is broken down further.
- 3. Each level of the WBS is a smaller piece of the level above.
- 4. The WBS includes only deliverables that are really needed.
- 5. Deliverables not included in the WBS are not part of the project.



### **WBS** Benefits

### Benefits:

- 1. It helps prevent work from slipping through the cracks.
- 2. It provides the project team members with an understanding of where their pieces fit into the overall project management plan.
- 3. It facilitates communication and cooperation among team members.
- 4. It helps prevent changes.
- 5. It provides a basis for estimating staff, cost, and time.
- 6. It gets team buy-in and builds the team.
- 7. It helps people get their minds around the project.

No doubt, the biggest challenge in developing a WBS is making sure to define the logical relationship between all program elements without constraining work necessary to achieve program objectives and requirements.

Other potential challenges that may be encountered during construction of the WBS are outlined on the clipboard.

- Too little or too much detail in the level of WBS management and reporting
- Maintaining a product-oriented (deliverable) focus in the structure
- Maintaining a balance between the program definition aspects of the WBS and its datagenerating aspects. The primary purpose of the WBS is to define the scope of the work effort through decomposition of the program's deliverable elements.



Under a professional project management methodology, every single project you manage must have a WBS.

You cannot afford to misunderstand this important project management tool.

Why?

Without it, the project will take longer, elements will slip through the cracks, and the project will be negatively impacted.

### WBS Tips

Knowing that there is no single correct way to organize or depict the deliverable hierarchy legs on the WBS, there are a lot of ineffective ways to represent the deliverables. These guidelines should be followed to produce an effective WBS for the project:

- 1. Use nouns, not verbs, to keep the focus on deliverables versus activities to create the deliverables
- 2. Use a hierarchy structure to illustrate the relationship of deliverable for the scope of the project
- 3. Build the WBS collaboratively with the people who will ultimately produce the project deliverables
- 4. Ensure each WBS leg contains deliverables that are unique from deliverables in another leg we don't want to repeat the same deliverable in each column
- 5. Never make assumptions that stakeholders will naturally know that a deliverable element is part of the project even if it is not included in the WBS.
- 6. Follow the 100% rule when drilling down through the levels of the WBS. The 100% rule states that every level of decomposition in the WBS must contain all of the deliverable elements, which represent 100% of its parent deliverable. Refer to next slide.

### WBS Tips

Follow the 100% rule when drilling down through the levels of the WBS. The 100% rule states that every level of decomposition in the WBS must contain all of the deliverable elements, which represent 100% of its parent deliverable.

- > Rule states that the WBS:
  - ❖ Includes 100% of the work defined by the project scope
  - Captures all internal, external, and interim deliverable in terms of work to be completed, including project management
- ❖ The sum of the work at the "child" level must equal 100% of the work represented by the "parent"
- ❖ WBS should not include any work that falls outside the actual scope of the project, that is, it cannot include more than 100% of the work

### WBS Checklist

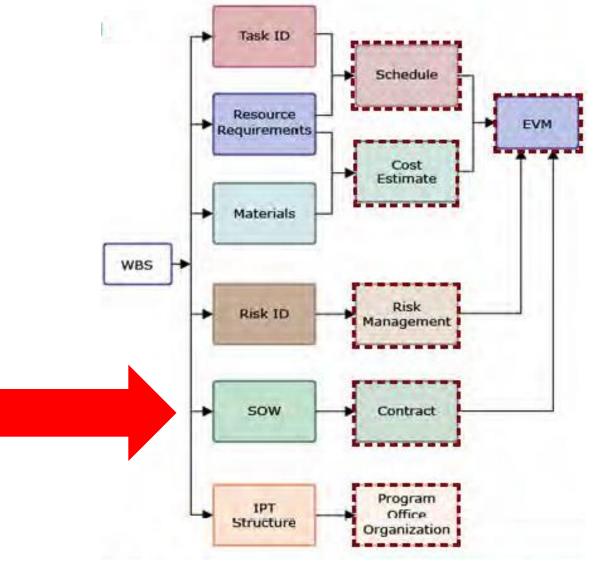
This is a checklist to use when reviewing the quality of a Work Breakdown Structure:

- ✓ Does it define 100% of the work that will be produced by the project?
- ✓ Does each element represent a deliverable?
- ✓ Does it use a coding structure so that each element has a unique ID that shows its place in the hierarchy e.g. 1.1, 1.2, 1.1.1, 1.1.2?
- ✓ Will project stakeholders be able to understand the project scope from the WBS?
- ✓ Does it capture all external and internal deliverables including project management deliverables?
- ✓ Does each level represent 100% of the work required to deliver the parent level?
- ✓ Is the decomposition sufficient that the tasks required to deliver each work package can easily be identified?
- ✓ Is it in the format that gives a clear graphical, textual or tabular breakdown of the project scope?

### WBS Checklist

- ✓ Was it created by those who will be performing the work?
- ✓ Is it being regularly updated as project changes are approved?
- ✓ Does it allow you to estimate costs accurately?
- ✓ Does the WBS have logical summary elements that can be used in tracking progress and performance?
- ✓ Does the WBS provide sufficient detail to create a Resource Assignment Matrix?
- ✓ Is the WBS sufficient to support reporting at a team, project, program and portfolio level?
- ✓ Does the WBS align with the size and complexity of the project? Is it sufficiently detailed to support planning and control, but not so detailed as to become cumbersome?

Putting the WBS to work for you is an important part of managing a program. Since the WBS ties all aspects of your program together, you can use it to build and report on other activities.

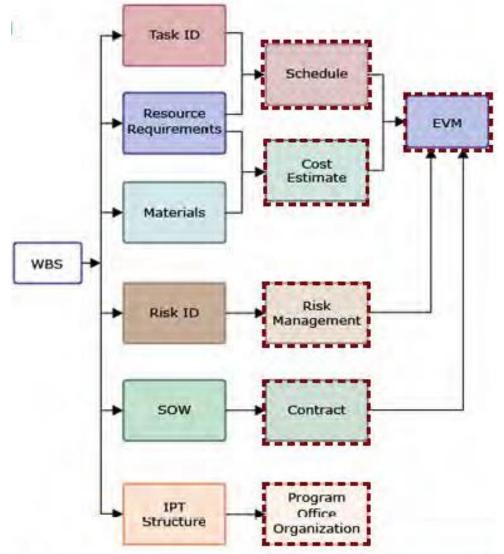


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#### Schedule

The WBS assists in building the schedule by:

- Decomposing the work packages into the specific individual work tasks that must be completed to produce the product
- Identifying tasks, amounts, and types of resources
- Estimating the amount of effort and time required to complete the tasks



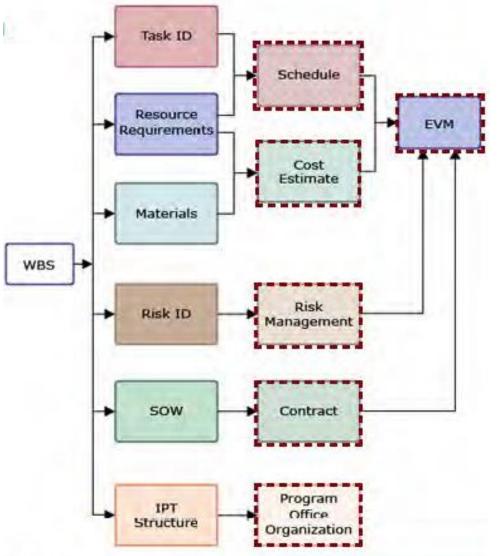
X

#### **Cost Estimating**

The WBS assists in building the Cost Estimate by:

- · Identifying resources
- · Identifying length of tasks
- Identifying materials

The direct costs associated with each work package can then be summed as part of the overall program cost estimate.

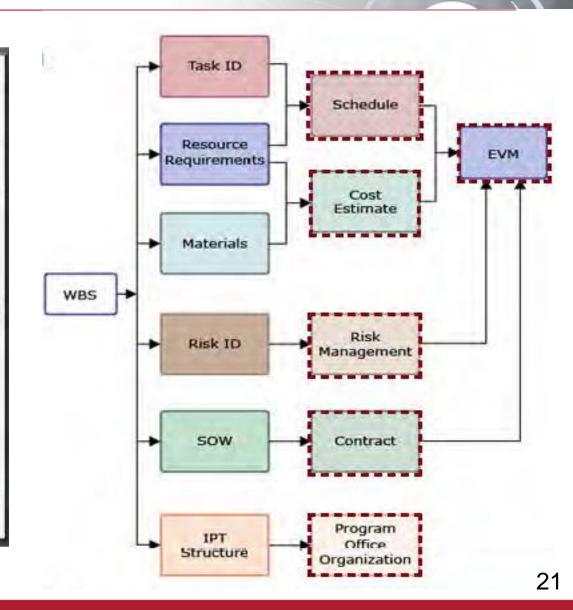


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#### Risk Management (RM)

The WBS is ideal for assisting in the development of a risk management plan (RMP), as it provides a common frame of reference for all contract line items and end items. Programs should use the WBS as a basis for identifying all the tasks that should be analyzed for risk, for monitoring risks at their respective levels (primarily for impact on cost and schedule performance), and for evaluating the resulting effect of risks on the overall program.

Following risk handling planning, the program should update the WBS as needed to reflect selected risk handling activities. Continuous observation is essential to RM. Riskier program subcomponents are potential starting points for program schedule slippages and cost overruns.

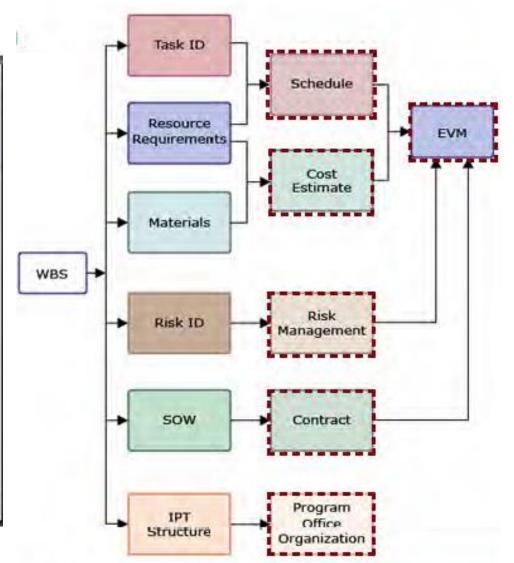


#### Contract

The WBS should be linked with the contract Statement of Work (SOW) and is typically used to develop the SOW.

The SOW clearly and concisely describes the program deliverables and the work that must be performed to produce them.

The WBS allows for decomposition of the product to the level where the specific tasks required to produce it can be defined. This provides the basis for understanding the scope of the work involved and leads to a clearer, more complete descriptive statement of the work required.



### A WBS is not the following:

- 1. A "To-Do" list
- 2. A schedule
- 3. A cost estimate
- 4. A tool that make your life harder

### Don't Do This (to-do list)

#### 1.1 Requirement Document

- 1.1.1 Initial mtg
- 1.1.2 IPT team
- 1.1.3 Team Charter
- 1.1.4. System Requirement Review
- 1.1.5 System Functional Review
- 1.1.6 Draft Requirement Document
  - 1.1.6.1 Team Review
  - 1.1.6.2 User Review
  - 1.1.6.3 Leadership Review
- 1.1.7 Final Requirement Document
  - 1.1.7.1
  - 1.1.7.2
  - 1.1.7.3
- 1.1.8 Requirement Verification
- 1.1.9 ect.

### Do This (just list deliverables)

- 1.1 Requirement Document
  - 1.1.1 Draft Requirement Document
  - 1.1.2 Final Requirement Document

# Government WBS/ Program WBS

The Program WBS <u>usually</u> consists of three levels with associated definitions. Each element provides logical Level 1 summary levels for assessing technical accomplishments, supporting the required event-based technical reviews, and for measuring cost and schedule performance.

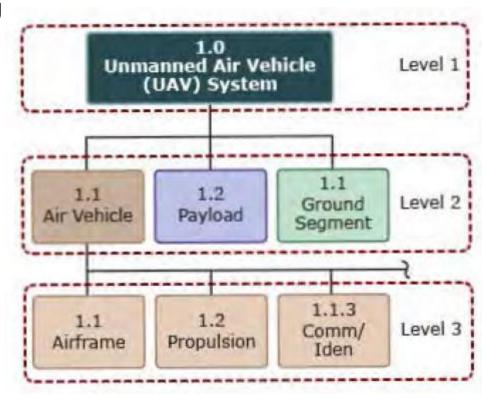
Each lower level of the WBS follows the same process of hierarchical decomposition and represents an increasingly detailed definition of the work in the program.

The Program WBS structurally illustrates a clear understanding of the full scope of work to be performed by both the government and contract entities. To establish this foundation the Program WBS should:

- Structurally depict the framework for the program's technical objectives and end items/products.
- Be product-oriented to enable more accurate definition of the work that will be performed by both entities.

The elements contained in the Program was should identify all the work products, whether they are hardware, software, equipment, data, or services.

The following example shows a Program was for a generic Unmanned Aerial Vehicle (UAV) system. This example uses a numbering system called a coding scheme. Each was should contain a coding scheme that 1denafies each of the elements within the was and the relationship among them.

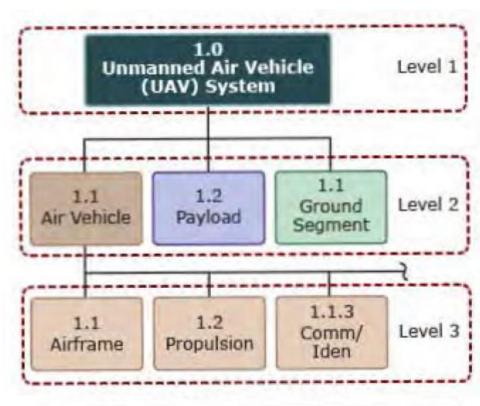


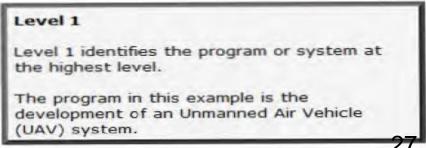
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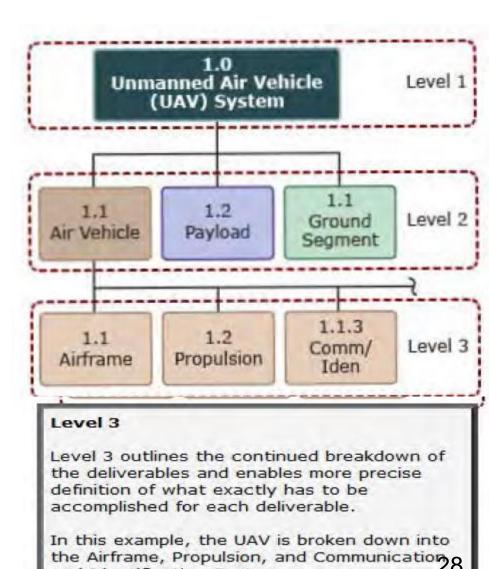


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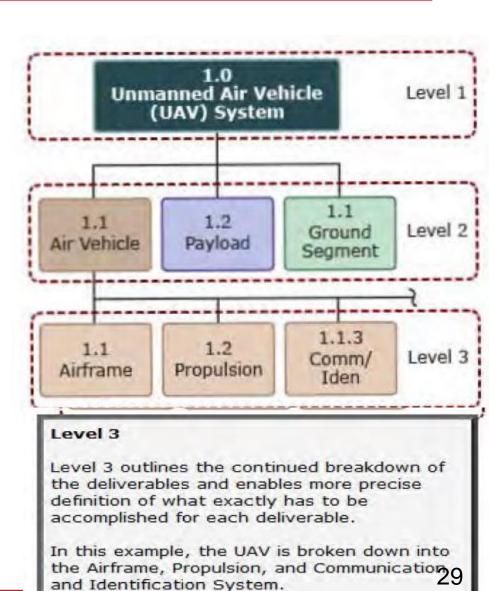
and Identification System.

The Program WBS structurally illustrates a clear understanding of the full scope of work to be performed by both the government and contract entities. To establish this foundation the Program WBS should:

- Structurally depict the framework for the program's technical objectives and end items/products.
- Be product-oriented to enable more accurate definition of the work that will be performed by both entities.

The elements contained in the Program was should identify all the work products, whether they are hardware, software, equipment, data, or services.

The following example shows a Program was for a generic Unmanned Aerial Vehicle (UAV) system. This example uses a numbering system called a coding scheme. Each was should contain a coding scheme that 1denafies each of the elements within the was and the relationship among them.



### Contract WBS

Now let's learn about the Contract WBS. This is developed by the contractor and approved by the government for program reporting purposes. The Contract WBS includes all product elements that are the responsibility of the contractor.

The following are the types of elements included in a Contract WBS:

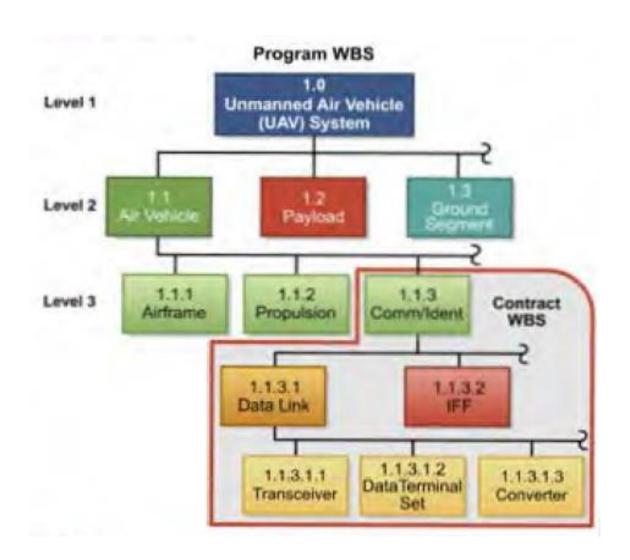
- Hardware 1s the physical equipment that makes up a system, such as storage devices for computers, or combat equipment for weapons.
- Software can be computer programs, procedures, and other associated documentation of a computer system.
- Data 1s any form of recorded information delivered under contract.
- Services consist of any work performed for the benefit of the program.

### Contract WBS

The Contract WBS extends down to the agreed-to contract reporting level and any extended lower levels needed for reporting or other purposes.

It also defines the lower level components of what is to be procured. This more detailed WBS forms the framework for the contractor's management control system. It must be tailored to the program so that it does not unnecessarily constrain the contractor in meeting defined contract requirements.

The following example presents the UAV system and includes the Contract WBS for the Communation/Identification System for the UAV.



## Program WBS and Contract WBS

The Program WBS captures all efforts of a program performed by both government and contractor. Program WBS elements that will be contracted are reflected in the Contract WBS.

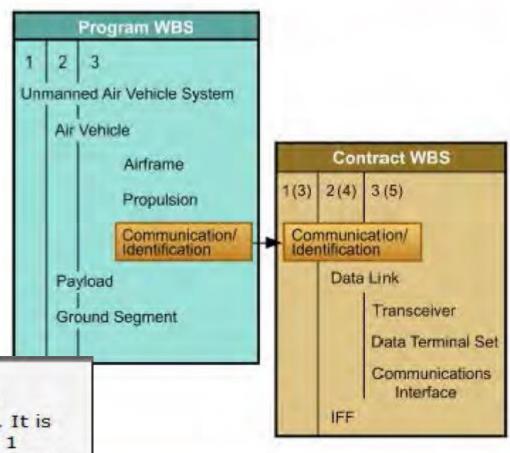
The contracted system is identified at Level 1 of the Contract WBS with all applicable Level 2 Common WBS elements included.

This figure represents another way in which you may see a WBS structure depicted, including the relationship between the Program and

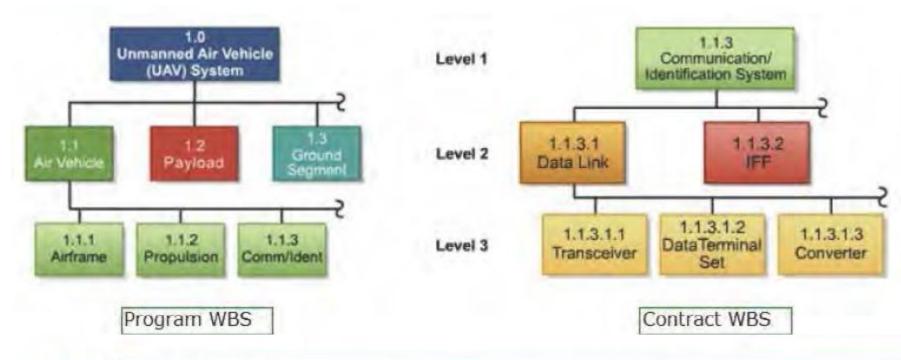
Contract

In this example, the element
Communication/Identification System has a
Contract WBS included in the Program WBS. It is
Item 1.1.3 in the Program WBS, but a Level 1
element in the Contract WBS, and bears the same
numeric identifier in both WBSs.

The Contract WBS further details components of the system that are needed for its completion.



## Program WBS and Contract WBS





The Program WBS refers to the high-level, product-oriented breakdown of the program. It includes Contract WBSs that further breakdown requirements for individual elements of the program that are contracted. Together, the Program WBS and associated Contract WBS comprise the complete hierarchical description of the system being procured.

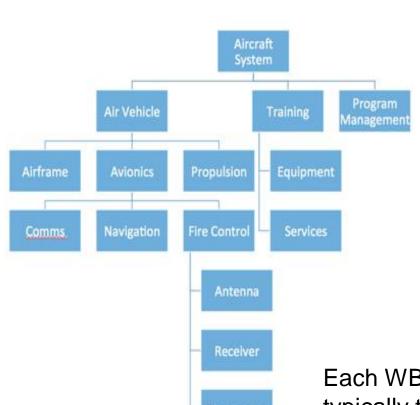
## WBS Dictionary

The WBS dictionary is a companion document to the WBS, and lists and defines each element contained in the WBS.

The Data Item Description (DI -MGMT-81334D) provides a format for a Contract WBS dictionary. It will typically be constructed in a hierarchical format and include the numerical code (WBS Code), element name, and detailed description of what is included in each WBS element (Element Definition).

	Contract Work Breakdown	Program: Vector Surfa	ce to Air Interceptor	RFP NO: XXXXX	Contract Plan No: A-10-X-C1	
	Structure Index			Contract No: DAAE07-XX-E-0001		
					DATE: 6/14/2010	
	CWBS ELEMENT NAME		CWBS DEFINITION			
CWBS CODE						
			This WBS element includes the cost of the Vector missile All Up Round (AUR) in addition to the cost of the			
			common WBS elements. The Vector missile is an Army Surface-to-Air interceptor missile providing 360			
			degree coverage for the air defense mission of forward deployed forces. It is a Single-stage, short-range,			
			low -to high-altitude theater missile defense system that utilizes advanced guidance and control technologies			
			including an advanced active RF seeker to extend the range of engagement beyond current and projected threats. This WBS element reports the total development or production cost, whichever is applicable to the			
			instant contract, of the All Up Round (AUR) through the cost for the common WBS elements. WBS elements			
			1.1 Air Vehicle and 1.2 Command and Launch are the two child WBS elements that capture the cost of the			
1.0	Vector Surface to Air Interceptor	Missile System	product, w hile WBS elements 1.3 through 1.1.1 capture the cost of the "common elements".			
			This element refers to the means for delivering the destructive effect to the target, including the capability to			
			generate or receive intelligence to navigate and penetrate to the target area and to detonate the warhead. This			
			element includes the design, development, and production of complete units (prototype and operationally			
			configured units, which satisfy the requirement of their applicable specifications) regardless of their use. This WBS element has eleven children WBS elements. The government CWIPT has required, through the use of a			
			CA-approved Plan for the Vector Missile, that WBS element 1.1.6 Guidance and Control will contain two child			
			WBS elements, each one containing a low er levels of WBS indenture in order to capture the cost of the			
1.1	Air Vehicle		specific cost driving elements within the G&C element.			
			This WBS element includes	the cost of the Vector missile's rocket mo	otor and labor required to integrate and	

## WBS Dictionary

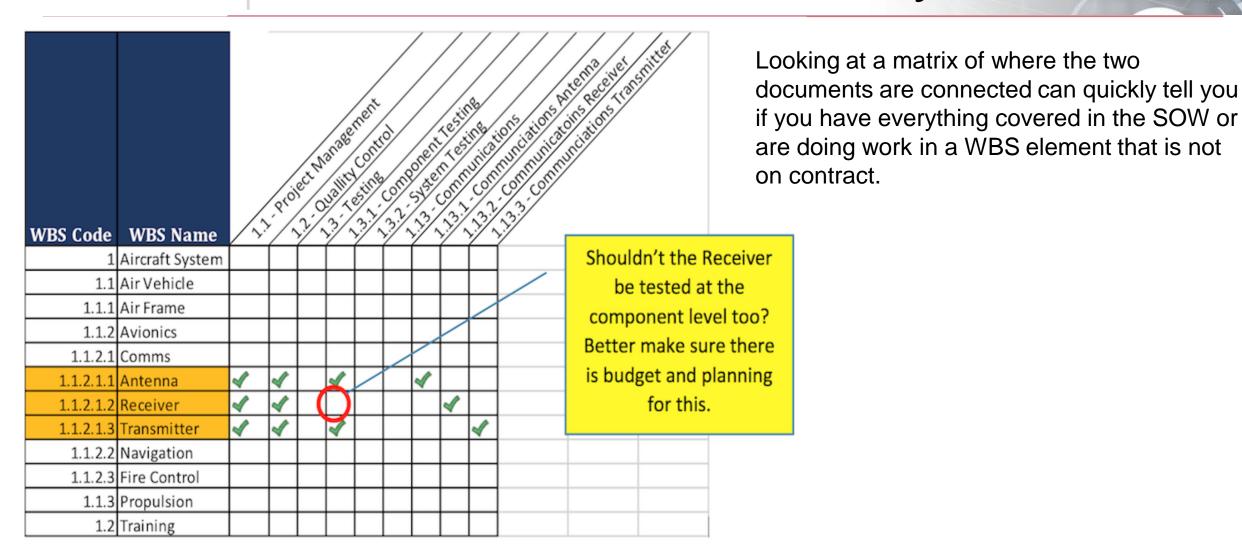


ransmitte

WBS Level	WBS Code	WBS Name	WBS Description	PWS/SOW Mapping
1	1	Aircraft System	X Series Aircraft System to fly to the moon	
2	1.1	Air Vehicle	X Series Air Vehicle to fly to the moon	
3	1.1.1	Air Frame	X seriese air frame	
3	1.1.2	Avionics	Brains behind the air frame	
4	1.1.2.1	Comms	Communications	
5	1.1.2.1.1	Antenna	Thinging to pick up signals	1.1, 1.2, 1.3.1, 1.13.1
5	1.1.2.1.2	Receiver	Box to interpert signals picked up by Antenna	1.1, 1.2, 1.13.2
5	1.1.2.1.3	Transmitter	Box to send out signals when we talk	1.1, 1.2, 1.3.1, 1.13.3
4	1.1.2.2	Navigation	Back seat driver	
4	1.1.2.3	Fire Control	Off/Def weapons in case we run into aliens	
3	1.1.3	Propulsion	Engine to propel x series air frame	
2	1.2	Training	Training for operation and maintenance of X Series Air Vehicle	

Each WBS element should be associated to at least one SOW paragraph, but typically they will be related to multiple paragraphs. If you have a WBS element that is not associated with a SOW paragraph you have to ask "why are we doing this?" because it's apparently not part of the contract. Conversely, each SOW paragraph should be related to at least one WBS element and it usually touches multiple WBS elements.

## **WBS** Dictionary





### **True or False**

Each WBS element should be associated to at least one SOW paragraph, but typically they will be related to multiple paragraphs.



## **Answer is True**

Each WBS element should be associated to at least one SOW paragraph, but typically they will be related to multiple paragraphs.



### Select the correct answer:

To keep the focus on deliverables versus activities to create the deliverables, use what on a WBS?

- 1. Verbs
- 2. Nouns
- 3. Both
- 4. Adjectives



## **Answer is Verbs**

To keep the focus on deliverables versus activities to create the deliverables, use what on a WBS?

- 1. Verbs
- 2. Nouns
- 3. Both
- 4. Adjectives



The purpose of the WBS is to take the overall project scope into clearly defined deliverables.

- 1. True
- 2. False



### **Answer is True**

The purpose of the WBS is to take the overall project scope into clearly defined deliverables.

- 1. True
- 2. False



### The WBS should be developed by?

- 1. The subject matter expert only
- 2. The team associated with the project
- 3. Only the contractor
- 4. Pick someone who is not busy



### Answer- The team associated with the project

The WBS should be developed by?

- 1. The subject matter expert only
- 2. The team associated with the project
- 3. Only the contractor
- 4. Pick someone who is not busy



## Select the correct answer:

The Government WBS should normally be at what level?

- 1. Level I
- 2. Level II
- 3. Level III
- 4. Level IV



### **Answer is Level III**

### **Select the correct answer:**

The Government WBS should normally be at what level?

- 1. Level I
- 2. Level II
- 3. Level III
- 4. Level IV



### **Select the correct answer:**

True or False, The WBS should be linked with the contract SOW and is typically used to developed the SOW.



## **Answer is True**

### **Select the correct answer:**

True or False, The WBS should be linked with the contract SOW and is typically used to developed the SOW.

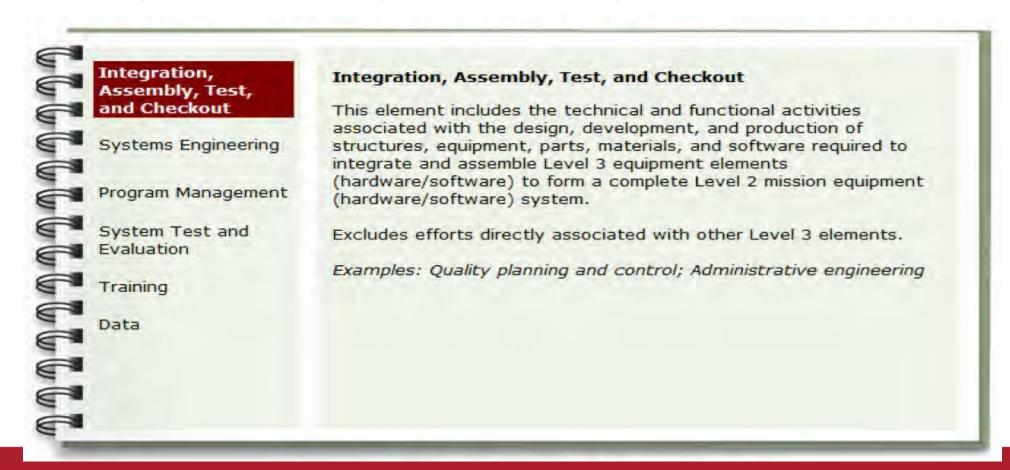
## **WBS Dictionary Template**

WBS Level	WBS Code	WBS Name	WBS Description	RISK

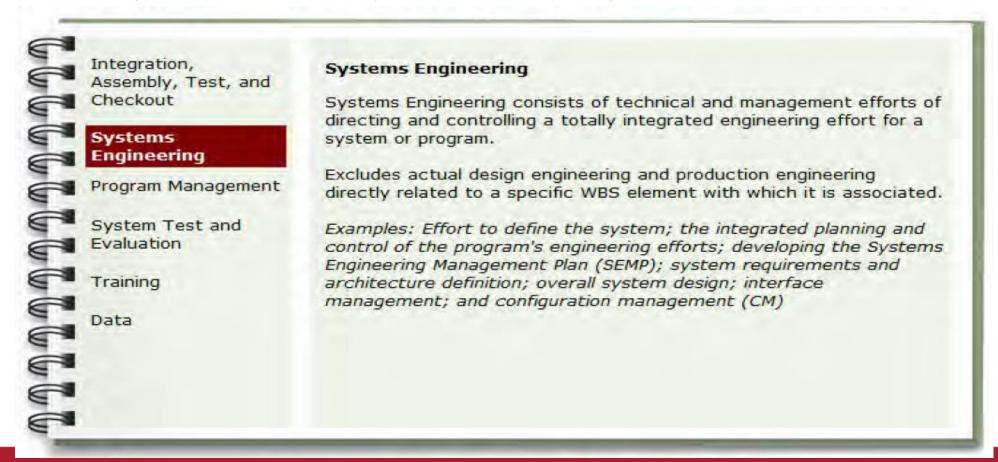
The DoD defines 10 categories of materiel items or systems used in a WBS. Defense materiel items include any equipment, apparatus, and supplies of a military force or other organization. Systems include the complex of equipment (hardware and software), data, services, and facilities required to develop and produce it

produce it. Automated Ground Sea Information Space Vehicle System System System System Launch Vehicle System Unmanned Aircraft Maritime System System Strategic Electronic/Avionics/ Missile Missile/ Generic System Ordnance System System

### Common Elements of a DoD WBS



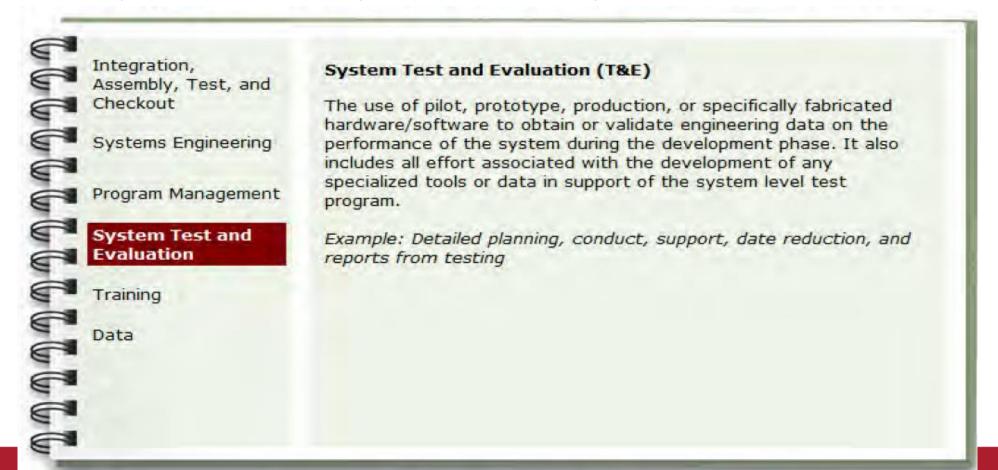
### Common Elements of a DoD WBS



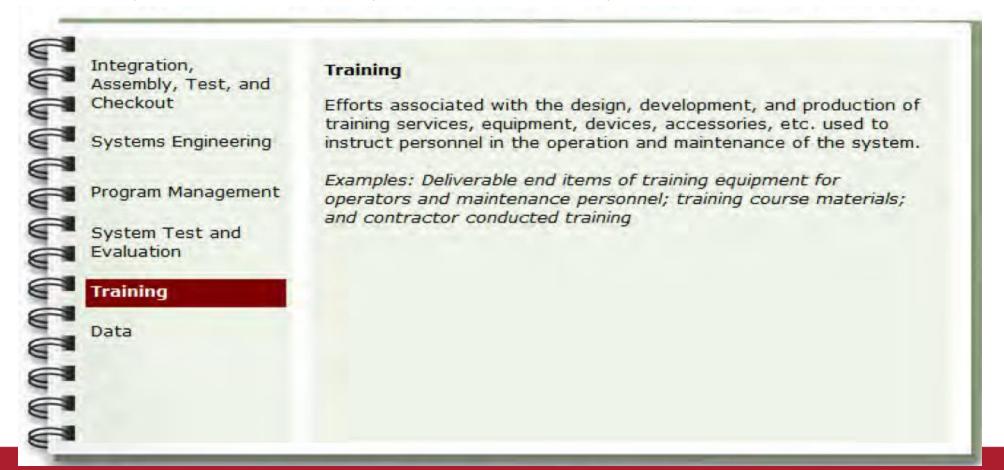
### Common Elements of a DoD WBS



### Common Elements of a DoD WBS

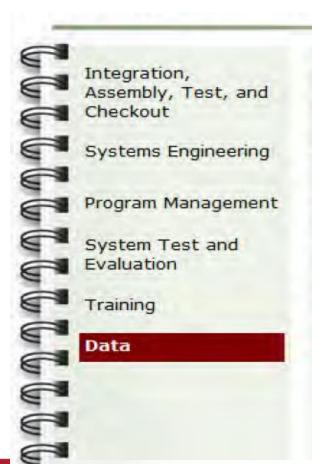


### Common Elements of a DoD WBS



### Common Elements of a DoD WBS

Common elements refer to the elements applicable to all major systems and subsystems. In the WBS, you will identify each materiel item/ system and then identify each applicable common element.



#### Data

The deliverable data required to be listed on a contract data requirements list (CDRL), DD Form 1423. Includes only such effort that can be reduced or avoided if the data item is eliminated; Government-peculiar data; acquiring, assembling, reproducing, packaging and shipping the data; transforming data into Government format; and reproducing and shipping data identical to that used by the contractor but in a different format.

Examples: Technical publications, technical data packages, contractor cost reports, general maintenance plans and reports; and training data

### Common Elements of a DoD WBS

Common elements refer to the elements applicable to all major systems and subsystems. In the WBS, you will identify each materiel item/ system and then identify each applicable common element.



### **Peculiar Support Equipment**

The design, development, and production of deliverable items (hardware/software) required to support and maintain the system or portions of the system while not directly engaged in its mission performance. These items do not include common support equipment.

Examples: Vehicles, equipment, tools, etc. used to fuel, service, transport, hoist, repair, overhaul, assemble, disassemble, test, inspect, or otherwise maintain mission equipment

### Common Elements of a DoD WBS

Common elements refer to the elements applicable to all major systems and subsystems. In the WBS, you will identify each materiel item/ system and then identify each applicable common element.



#### **Common Support Equipment**

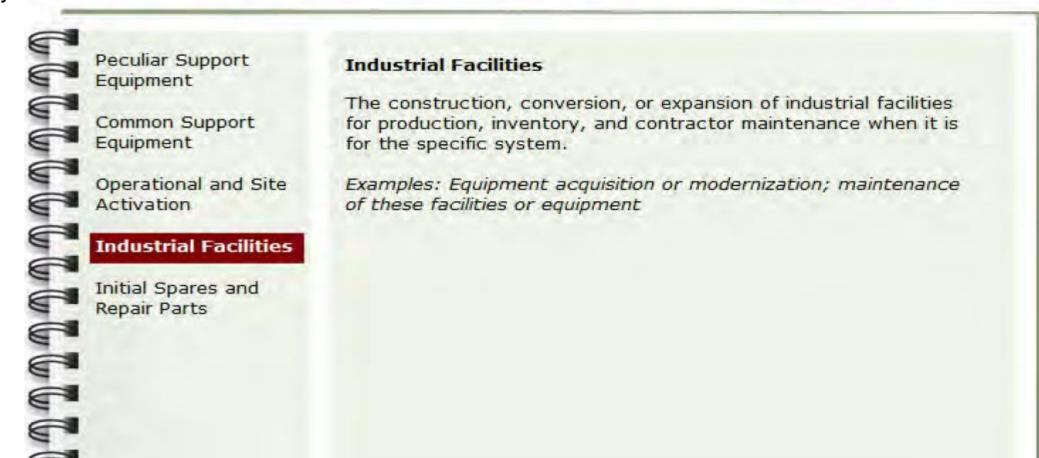
Items (hardware or software) required to support and maintain the system or portions of the system while not directly engaged in its mission performance. There are items which are already in the DoD inventory for support of other systems.

Examples: Acquisition of additional quantities of common equipment needed to support an item

### Common Elements of a DoD WBS



#### Common Elements of a DoD WBS



### Common Elements of a DoD WBS

Common elements refer to the elements applicable to all major systems and subsystems. In the WBS, you will identify each materiel item/ system and then identify each applicable common element.



### **Initial Spares and Repair Parts**

The deliverable spare components, assemblies, and subassemblies used for initial replacement purposes.

Examples: Repairable spares and parts required as initial stockage to support and maintain newly fielded systems, such as pipeline and reserve quantities

