

WELCOME!

INCOSE Enchantment Chapter Monthly Meeting



We're glad you're here.

We respectfully request:



ComputerHope.com

- Mute your audio when you are not speaking
- *6 toggle or in GlobalMeet left-side, your name

Discussion and questions are encouraged!

Put questions in the chat box or unmute yourself to speak up.



Meeting Materials

Slide presentations can be downloaded prior to start of the meeting from the Meeting Materials page of our website:

<https://www.incose.org/incose-member-resources/chapters-groups/ChapterSites/enchantment/resources/meeting-materials>

If recording is authorized by speaker, the video will be posted at the link above within 24 hours.

SEP Training



CSEP Courses by *Certification Training International*:

CTI currently is offering online course offerings, see

<https://certificationtraining-int.com/incose-sep-exam-prep-course/>

Our chapter has two SEP mentors:

Ann Hodges alhodge@sandia.gov

Heidi Hahn drsquirt@outlook.com

Upcoming meetings



- September 8, 2021: Brian Kennedy, Leveraging Set-Based Practices to Enable Efficient Concurrency in Large Systems and Systems-of-Systems Engineering
- October 13, 2021: Jim Armstrong – “Kitchens”
- November 10, 2021: Jennifer Russell – “Smart Cities”

Introductions

- Please type your name, position, and organization in the Chat window



Photo by [Adam Solomon](#) on [Unsplash](#)

Survey



The link for the online survey for this meeting is

- www.surveymonkey.com/r/2021_08_MeetingEval

Your feedback is important!

Enchantment Chapter Monthly Meeting



WBS Integration with an Effective Schedule

Abstract: This presentation addresses the following questions:

- How a WBS fits into the big picture of planning and managing a project
- Why the WBS should form the foundation for project schedule development and elaboration
- The hierarchical structure of a WBS
- WBS nodes vs. project activities
- Managing and relating WBS data within a project schedule

Download recording from the Library at www.incose.org/enchantment

NOTE: This meeting will be recorded

Speaker Bio



Patrick Foley is a highly experienced project controls data specialist who has built and supervised the deployment of complex project data management platforms. His business and technical qualifications span more than 30 years. He is employed by PM Tec Inc. and currently on contract to Sandia Laboratories. As a scheduling expert he has functioned as a team lead, team member, and subject matter expert in schedule controls for projects requiring broad institutional implementation as well as projects requiring detailed unit operation process improvement. He is a scheduling expert in both Microsoft Project and Primavera P6. He is also an accomplished VBA code writer and database designer/engineer. As an active volunteer with the local PMI (Rio Grande) Chapter, he has delivered PMP prep course material for the chapter and conducted scheduler boot camp training at Sandia Labs.

Mr. Foley is a certified Project Management Professional (PMP) and holds an M.A. in Information and Communication Studies from California State University and a B.S. in International Business from the University of Colorado, Boulder.

The Work Breakdown Structure or “WBS”

Patrick Foley
8/11/2021

Topic Organization

- ▶ WBS Defined
- ▶ Organization of the WBS
- ▶ WBS as a Scope Statement
- ▶ Detail activities as they relate to the WBS
- ▶ WBS in the context of a project and activity derivation
- ▶ Numbering the WBS
- ▶ The PWBS & CWBS
- ▶ WBS is an attribute in a schedule database
- ▶ WBS as it relates to Earned Value

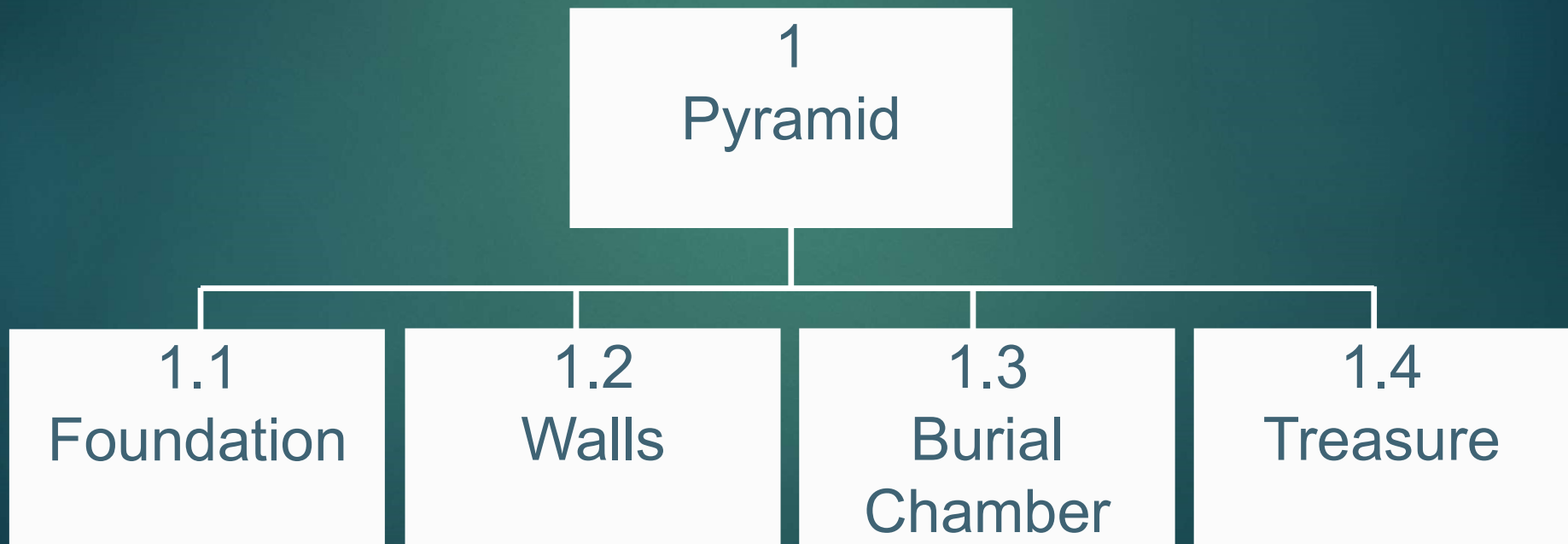
The WORK in the Work Breakdown Structure (WBS)

- ▶ The WBS is a parcel containing descriptors of ALL of the WORK required to execute a specific project.



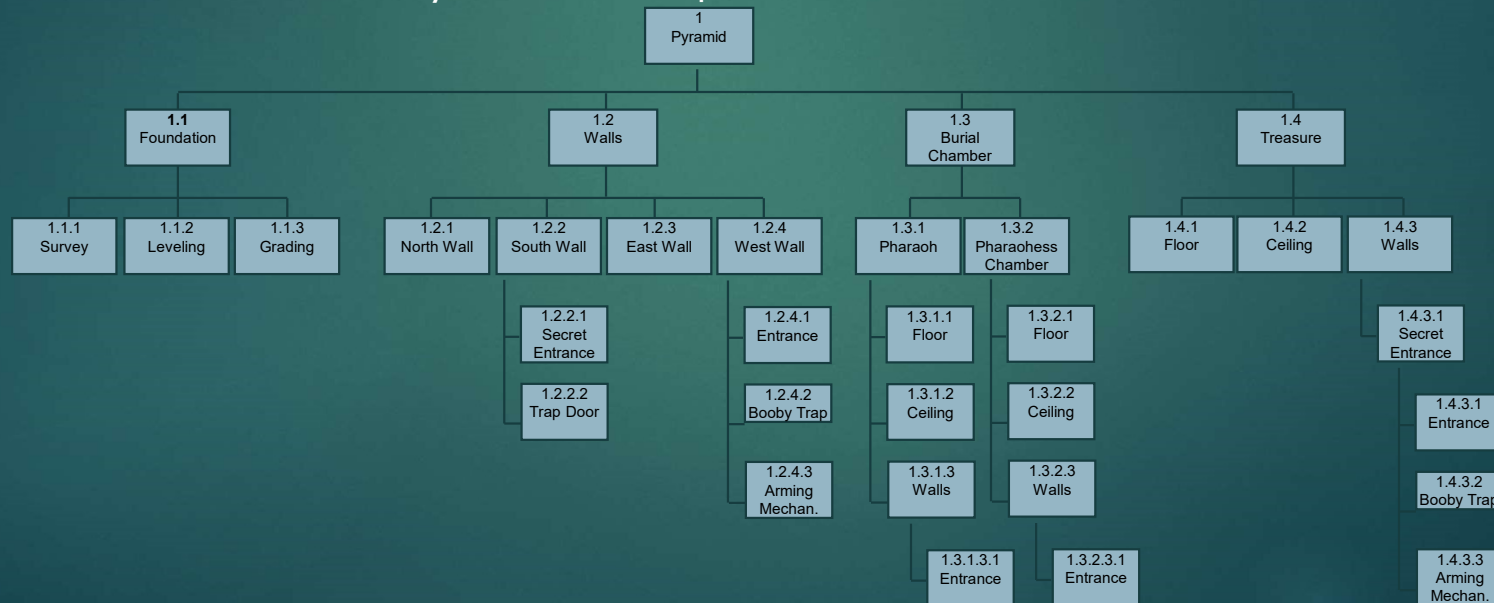
WBS is “Broken Down”

- ▶ WBS is broken down into a collection of smaller, manageable parcels
- ▶ Enables the organization of work, resource assignment and costs
- ▶ Parcels are usually organized by component.



Work Breakdown Structures (WBS) - Graphically

- ▶ The WBS is a hierarchical breakdown of project effort into lower level units of work (e.g. Work Packages) by deliverable product, existing procedures or process, etc.
- ▶ There is NO precedence logic or durations within the WBS. It is NOT a logical network/schedule.
- ▶ It represents the foundation of the Earned Value Management environment (Cost/Control Accounts) AND the “parents” of schedule activities.



WBS in the “Triple Constraint” of Project Management



SCHEDULE



**GOOD,
FAST or
CHEAP?**



RESOURCES

The WBS chart is a **GRAPHICAL DEPICTION** of a project scope statement

- ❖ *Changes to one will affect the others.*
- ❖ *You can only optimize two at a time!*



SCOPE

*Modifications to the WBS are likely to impact **SCHEDULE** and/or **RESOURCE** requirements*

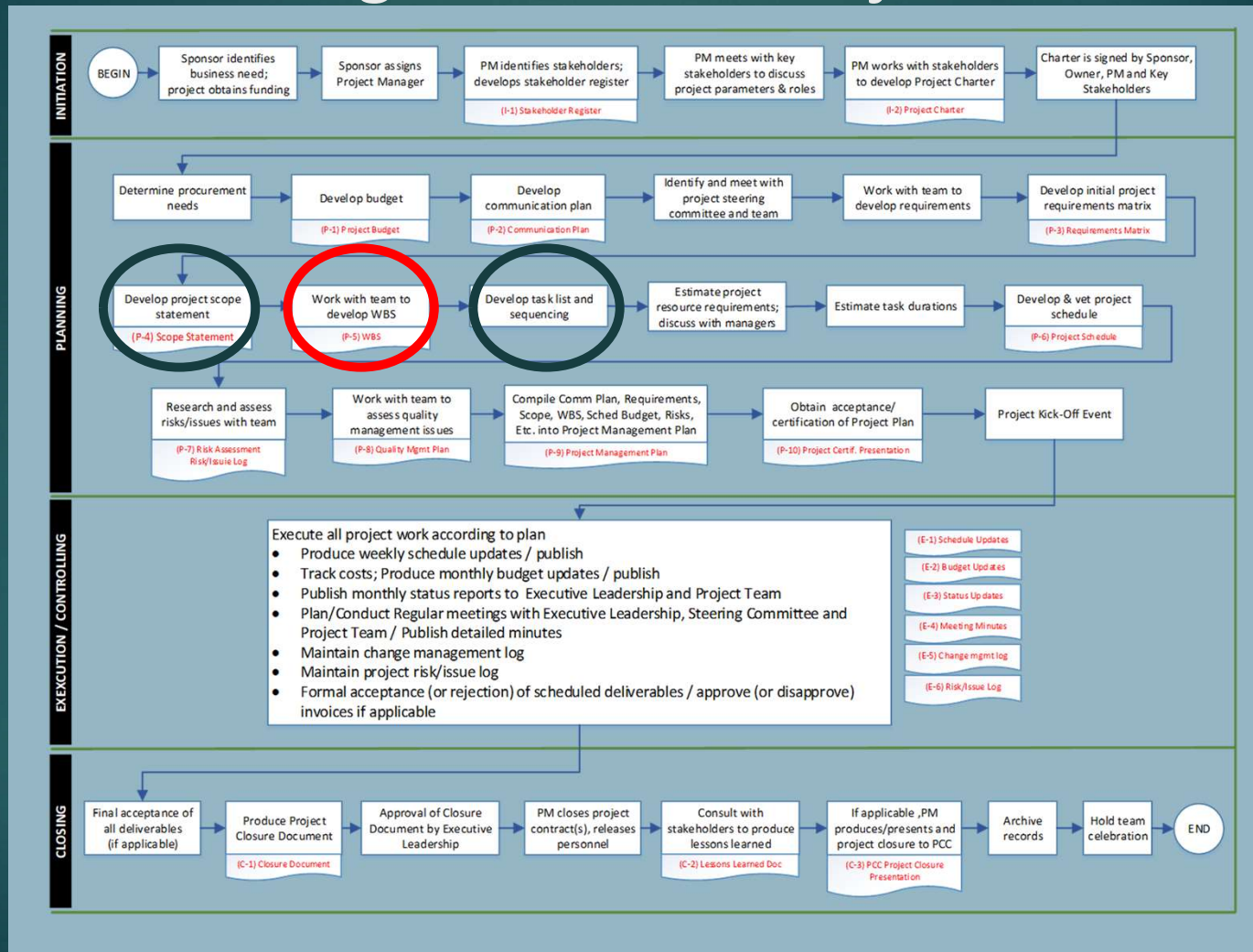


Basic Schedule development/elaboration



1. Develop Project Work Breakdown Structure (WBS)
2. Decompose WBS into activity list
3. Determine Activity Precedence
4. Estimate activity durations
5. Assign Resources

WBS Within the Big Picture of a Project



Numbering the WBS

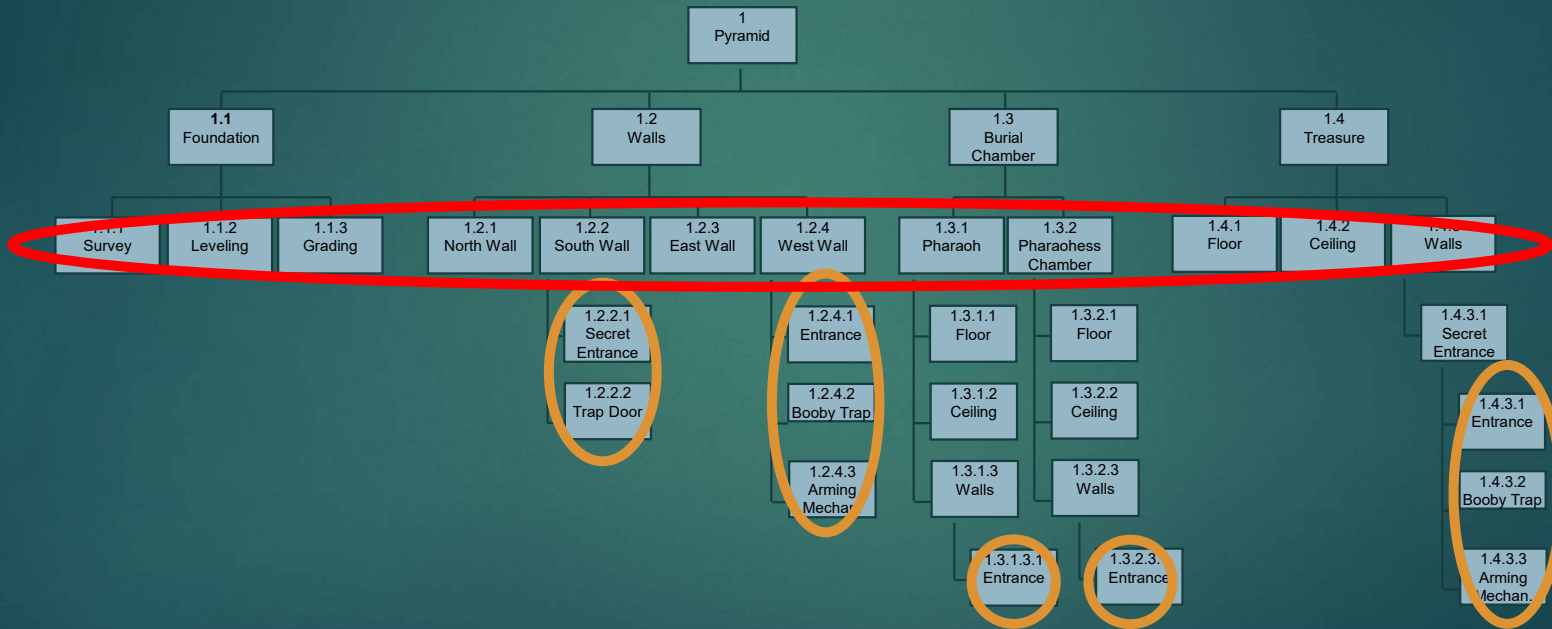
- ▶ While there is no specific rule on what type of numbering system to use in a WBS, the pharaoh's manager chose to use a simple hierarchical numbering system on each node



You may have organizational standards or requirements for numbering your WBS (i.e. DOD is "MIL-STD-881C")

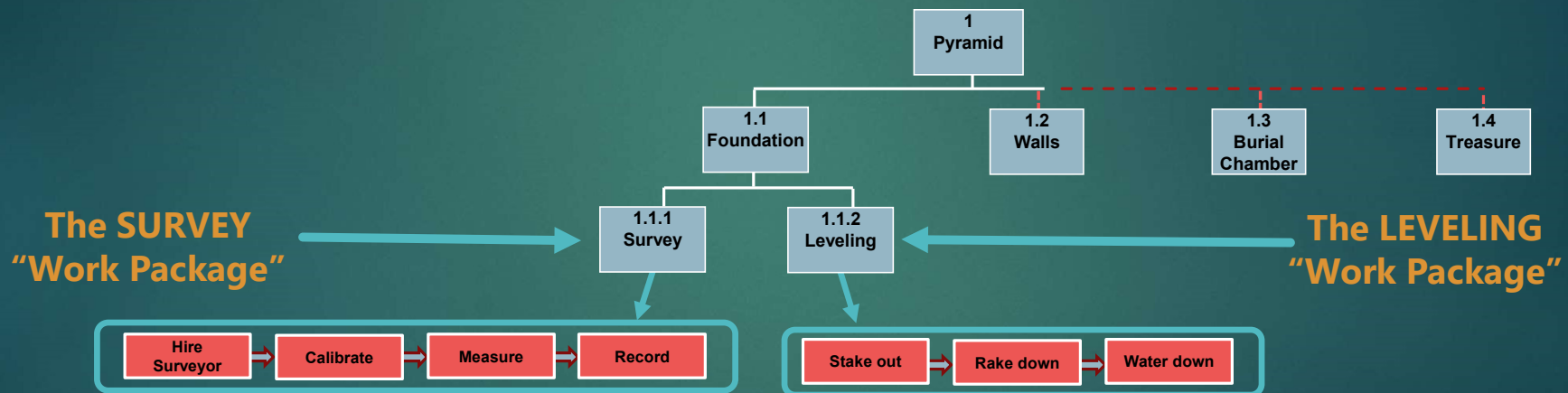
Control Accounts & Work Packages in the WBS

- ▶ Lowest Level Nodes in the WBS = Work Packages
- ▶ Nodes just above Work Packages = Control Accounts



Detail Activities as they relate to the WBS

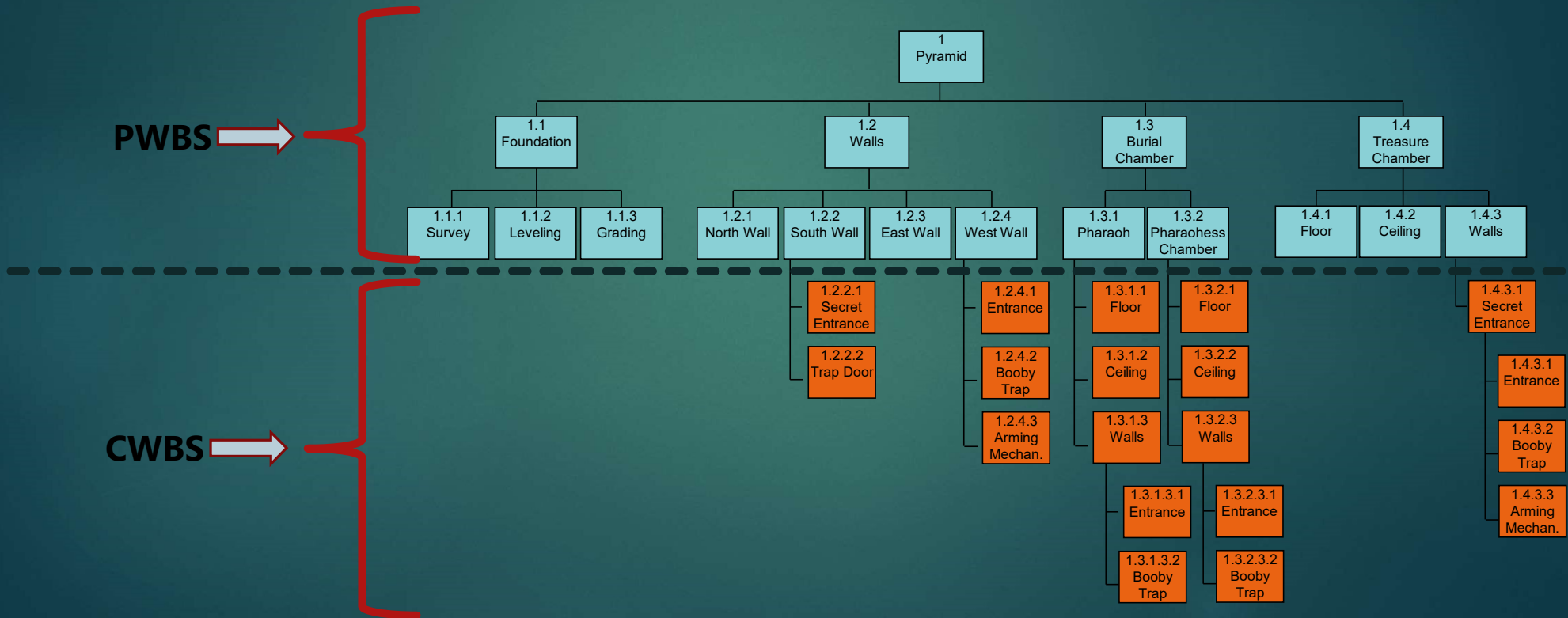
- ▶ Lowest-level WBS containers (Work Packages) are broken down into schedule activities. Detail activities in a project schedule represent a DECOMPOSITION of the lowest level nodes in the WBS into specific activities.



If an activity cannot be found in the WBS, it should not be in your schedule

WBS / PWBS / CWBS

- ▶ **WBS = Work Breakdown Structure**
- ✓ **PWBS = Program Work Breakdown Structure**
- ✓ **CWBS = Contract Work Breakdown Structure (> Level 3)**



A Project Schedule is a Database

- ▶ Schedule management programs are databases having tables, records and fields integrated with an elegant calculator
- ▶ The WBS FIELD is one of numerous attributes in a table of your activities

FIELD / Attribute

TABLE

RECORD

	WBS	Task Name	Duration	Start	Finish	Predecessor:
1	1	Development Project	581 d	5/1/12	7/22/14	
2	1.1	Contract Award	0 d	5/1/12	5/1/12	
3	1.2	Start	0 d	5/1/12	5/1/12	2
4	1.3	Project Management	415 d	5/1/12	12/2/13	
5	1.4	Non-Recurring	581 d	5/1/12	7/22/14	
6	1.4.1	Begin Non-Recurring	0 d	5/1/12	5/1/12	3
7	1.4.2	Integrated Product & Delivery System (IPDS) Kickof	1 d	5/1/12	5/1/12	6
8	1.4.3	Analysis	581 d	5/1/12	7/22/14	
9	1.4.3.1	Analysis Support	581 d	5/1/12	7/22/14	6
10	1.4.3.2	Preliminary Design Analysis	10 d	5/2/12	5/15/12	7
11	1.4.3.3	System Design Analysis	15 d	5/16/12	6/5/12	10
12	1.4.3.4	Preliminary Structural Analysis	10 d	5/23/12	6/5/12	10FS+50%
13	1.4.3.5	Structural Analysis	30 d	6/6/12	7/17/12	12,16
14	1.4.3.6	Thermal Analysis	15 d	8/8/12	8/28/12	13FS+50%
15	1.4.4	Design	165 d	5/1/12	12/17/12	

WBS in the Context of Earned Value Management

Basic Terms



WBS	Work Breakdown Structure
OBS	Organization Breakdown Structure
BAC	Budget at Complete
PV	Planned Value (BCWS)
EV	Earned Value (BCWP)
AC	Actual Cost (ACWP)

Formulas

CPI	Cost Performance Index (EV/AC)
CV	Cost Variance $(EV - AC)$
SPI	Schedule Performance Index (EV/PV)
SV	Schedule Variance $(EV - PV)$
TCPI	To Complete Performance Index $(BAC - EV)/(BAC - AC)$
ETC	Estimate to Complete $(EAC - AC)$
EAC	Estimate at Complete (BAC/CPI)
IEAC	Independent EAC (various)
VAC	Variance at Complete $(BAC - EAC)$



WBS in the Context of Earned Value Management

The screenshot shows an Excel spreadsheet with the following data table:

WBS Element	Values			Variance		Performance Index	
	Planned Value (PV)	Earned Value (EV)	Actual Cost (AC)	Schedule (EV - PV)	Cost (EV-AC)	Schedule (EV/PV)	Cost (EV/AC)
1.0 Analyze Requirements	43,000.00	38,000.00	42,000.00	(5,000.00)	(4,000.00)	0.88	0.90
2.0 Perform data staging	25,000.00	17,000.00	20,500.00	(8,000.00)	(3,500.00)	0.68	0.83
3.0 Develop ETL scripts	68,000.00	68,000.00	72,500.00	0.00	(4,500.00)	1.00	0.94
4.0 Design a corporate dashboard	14,000.00	12,500.00	12,500.00	(1,500.00)	0.00	0.89	1.00
5.0 Unit Testing	7,000.00	6,100.00	6,000.00	(900.00)	100.00	0.87	1.02
6.0 Migration to QA	13,500.00	10,000.00	12,500.00	(3,500.00)	(2,500.00)	0.74	0.80
7.0 User Acceptance Testing	5,000.00	6,000.00	4,000.00	1,000.00	2,000.00	1.20	1.50
Totals	175,500.00	157,600.00	170,000.00	(17,900.00)	(12,400.00)	0.90	0.93

QUESTIONS

