



PROJECT MANAGEMENT
CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING
Civil & Environmental Engineering Department



WORK BREAKDOWN STRUCTURES FOR FEDERAL CONSTRUCTION PROJECTS

Ivan Graff

2020 Project Management Symposium

**WORK
BREAKDOWN
STRUCTURES
FOR FEDERAL
CONSTRUCTION PROJECTS**

YOU HAVE LESS FLEXIBILITY THAN YOU THOUGHT

ABOUT YOUR PRESENTER

- Responsible for capital asset acquisition **project policy** at the U.S. Department of Energy.
- Agency budgets \$3 to \$5 billion on capital asset acquisition projects annually.
- Previously employers: National Science Foundation, Smithsonian Institution, USDA, and the University of Maryland College Park.
 - M.S., Civil Engineering (Construction Management), UMCP.
 - B.S., Bioresource Engineering (Structures), Rutgers University.



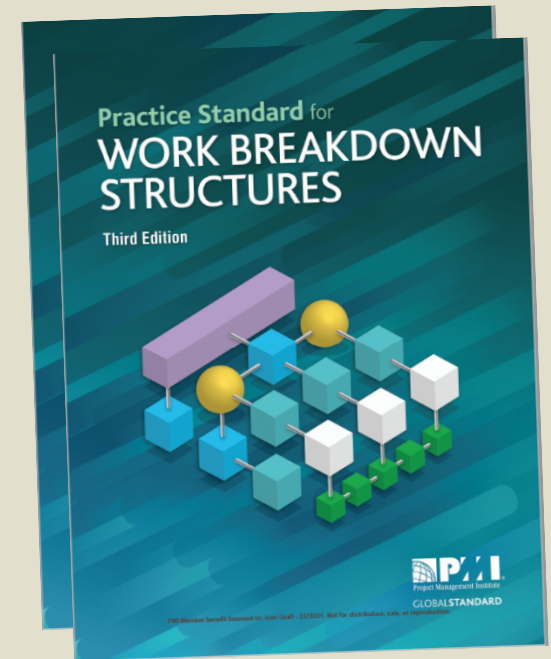
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The views expressed by the speaker do not necessarily reflect those of his employer.

WBS THEORY

Section 2.3 Principles

- Depicts all scope and project deliverables.
- First level accounts for the whole project.
- 100 Percent Rule.
- WBS elements do not:
 - Contain costs.
 - Imply importance.
 - Overlap.
 - Assign resources.
 - Account for time or sequence.

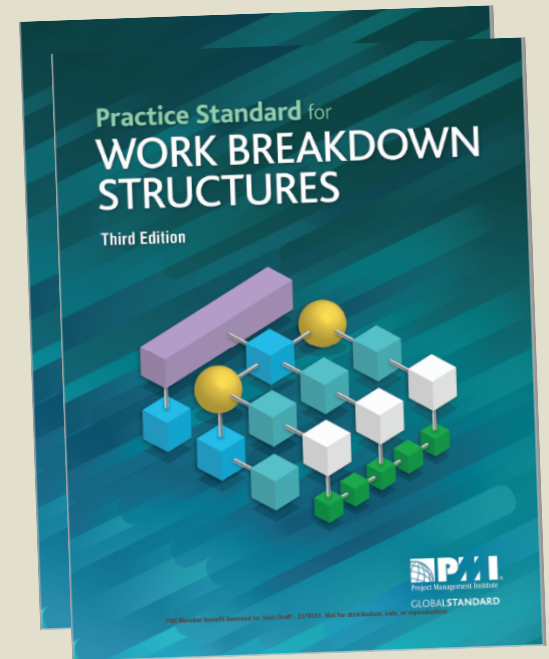


Project Management Institute. Practice Standard for Work Breakdown Structures, 3rd Edition. (2019)

KINDS OF DECOMPOSITION

Table 2-1: “A WBS of only one type of decomposition is rare.”

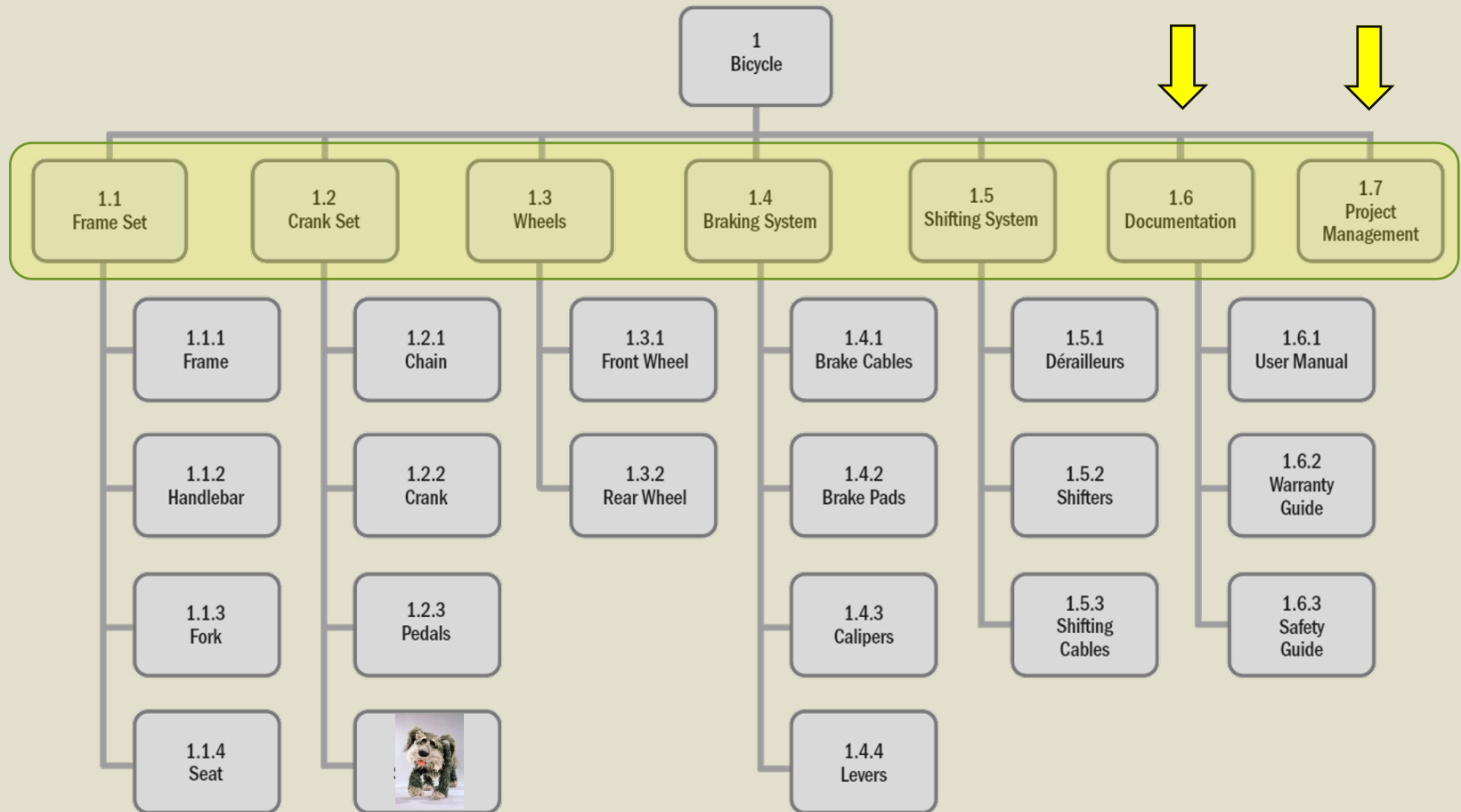
- Action
- Backlog
- Contract
- Deliverable
- Phase
- Product
- Program



Project Management Institute. Practice Standard for Work Breakdown Structures, 3rd Edition. (2019)

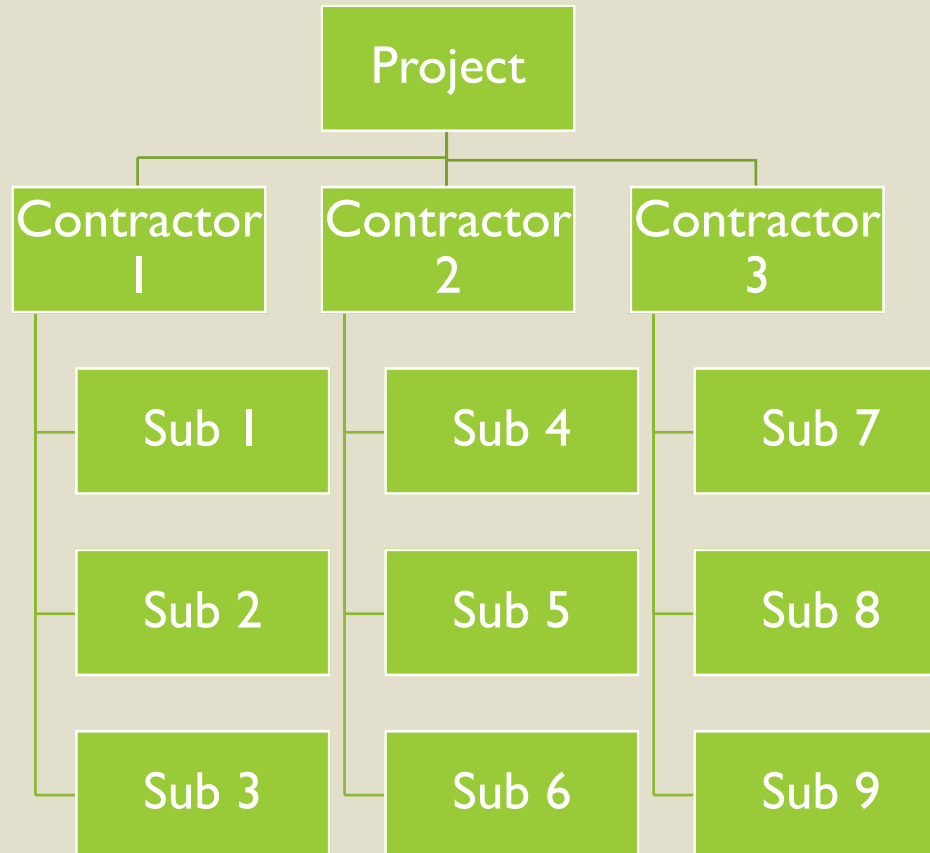
“Establishing a product-oriented WBS is a best practice” - GAO 20-195G

EXAMPLE WBS

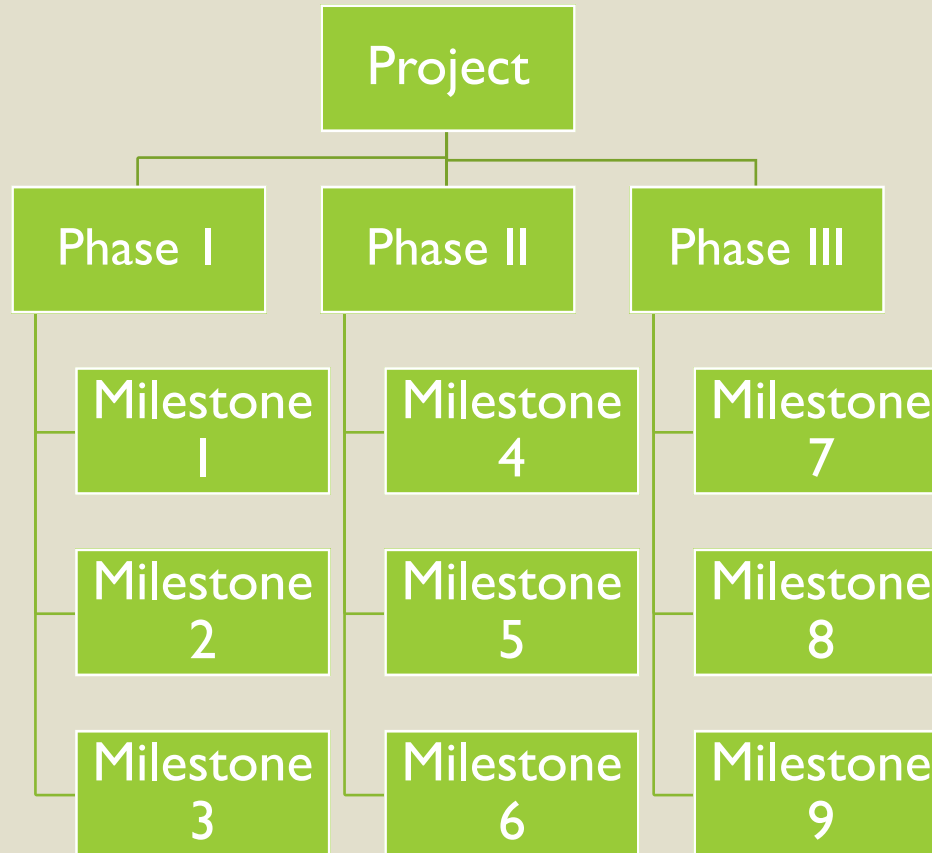


Practice Standard for Work Breakdown Structures, 3rd Ed. PMI. 2019

WBS AS CONTRACT PROXY



WBS AS SCHEDULE PROXY



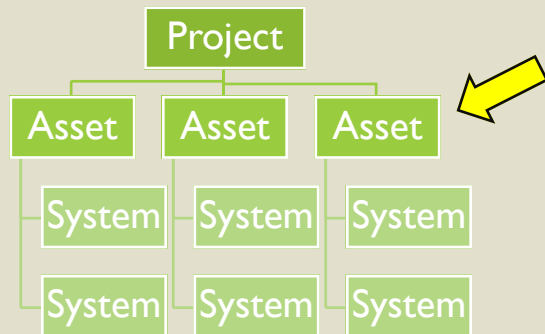
EIA-748D AND GAO 20-195G

PMI Says WBS elements do not ...	48 CFR §34.201(b) Earned Value Management Systems, EIA-748D, January 2019	Cost Estimating and Assessment Guide, GAO 20-195G, March 2020
Contain costs	Summarize direct costs from control accounts [2.3(b)]	Provides a basic framework for . . . estimating costs. [Page 56]

Standardized work breakdown structure benefits:

- Consistent **cost estimates**
- **Data** sharing
- Efficient program **execution**

Cost Estimating and Assessment Guide, GAO 20-195G, Page 64



**Does the Government
have a way to
standardize construction
work breakdown
structures?**

ROAD TO STANDARDIZATION

Statute and Regulations

**Federal Property
Management
Reform Act of 2016**
40 USC §524(a)(11)(B)(vi) & (xi)



Report the **total cost of capital expenditures** for each asset into ...

**Federal Assets
Sale and Transfer
Act of 2016**
40 USC §1303 Note
41 CFR §102-84^a



... a single **database** of all Federal real property.

Note a: New location of regulation as of 2019 not cited.

ROAD TO STANDARDIZATION

Federal Real Property Council Guidance (2019)

- **What do agencies report?** (41 CFR §102-84.40)
- Historical Capital Expenditures
(Data Element 16)
- Estimated Future Capital Expenditures
(Data Element 17)

ROAD TO STANDARDIZATION

Federal Real Property Council Guidance (2019)

BUILDING USE CODES

10 Office	60 Service
14 Post Office	72 Communication Systems
17 Outpatient Healthcare	73 Navigation and Traffic Aids
21 Hospital	74 Laboratories
22 Prisons	80 All Other
23 School	84 Border/ Inspection Station
24 Comfort Stations	85 Facility Security
25 Data Center	86 Land Port of Entry
28 Museum	87 Aviation Security Related
29 Other Institutional Uses	88 Public Facing Facility
30 Family Housing	89 Child Care Center
31 Dormitories/Barracks	
41 Warehouses	
50 Industrial	

STRUCTURE USE CODES

12 Airfield Pavements	71 Utility Systems
13 Harbors and Ports	72 Communication Systems
15 Power Development and Distribution	73 Navigation and Traffic Aids
16 Reclamation and Irrigation	75 Recreational
18 Flood Control and Navigation	76 Roads and Bridges
28 Museum	77 Railroads
40 Storage	78 Monuments and Memorials
50 Industrial	79 Miscellaneous Military Facilities
60 Service	80 All Other
65 Space Exploration	82 Weapons Ranges
66 Parking Structures	83 Renewable Energy
70 Research and Development	

ROAD TO STANDARDIZATION

Industry Standards

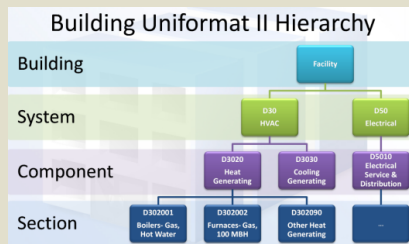
Federal Participation in
the Development and
Use of Voluntary
Consensus Standards

15 USC §272 Note
OMB Circ.A-119, Section 5 (2016)



Agencies must use
voluntary
consensus
standards

Options for Construction (non-inclusive)



ASTM E1557-09 (2015)
Systems oriented



SpecsIntact (2020) based on
CSI MASTERFORMAT (2018)
Item oriented

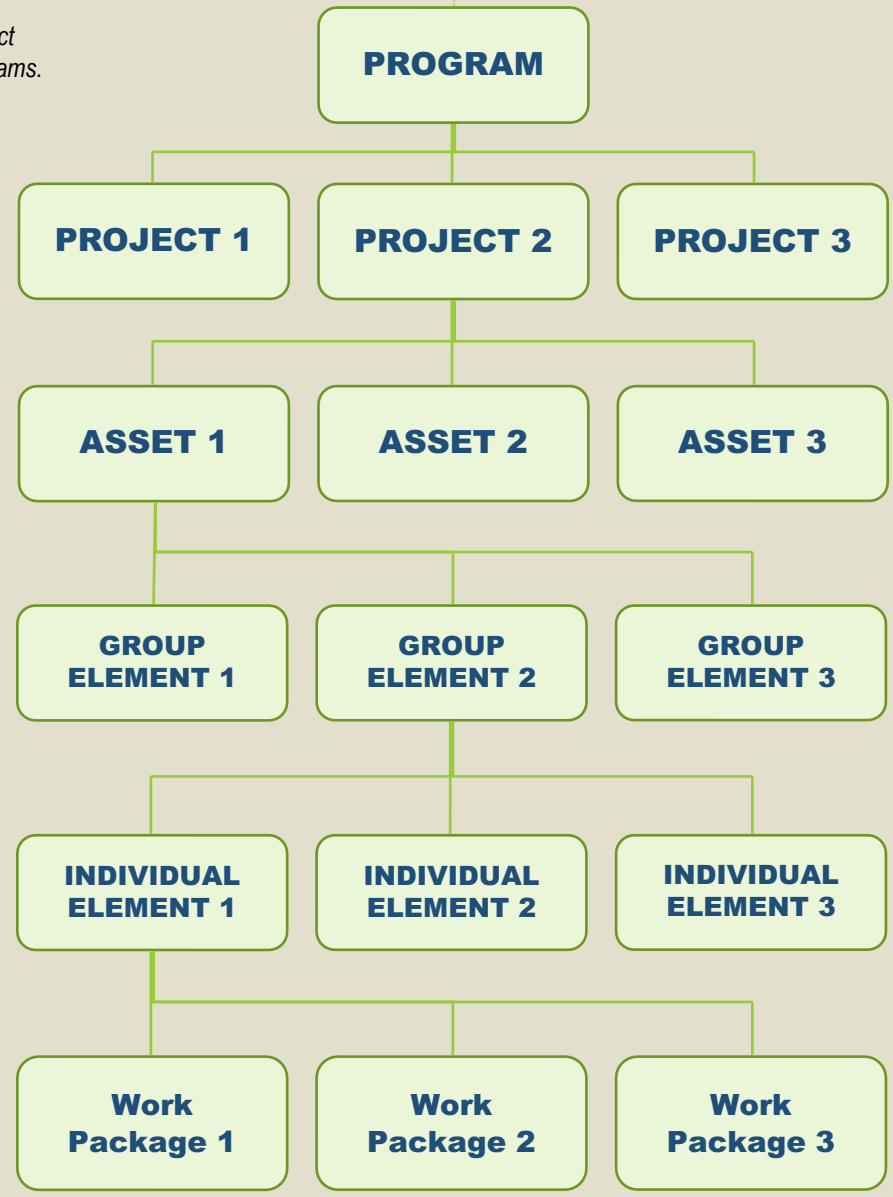


North American Industry
Classification System (2017)
Vendor oriented

Work Breakdown Structure Standardization

for Capital Asset Acquisition Projects

- Level 0 *WBS levels above the project correspond to sites or programs.*
- Level 1
- Level 2
- Level 3 *Multiple levels of group elements permitted.*
- Level 4 *Multiple levels of individual elements permitted.*
- Level 5 *Include level of effort items such as management on this or lower levels.*



Basis

Federal Real Property Profile Use Codes. 40 USC § 524(a), 40 USC § 1303 Note, and 41 CFR § 102-84

UNIFORMAT II (ASTM E1557) or CSI MASTERFORMAT Spec. 01 50 ff. or NAICS

UNIFORMAT II (ASTM E1557) or CSI MASTERFORMAT Spec. 01 50 ff. or NAICS

CSI MASTERFORMAT or NAICS

WBS CHALLENGES

- Allocating **costs** collected through a “WBS with issues” to **assets**.
- Documenting **level of effort** activities such as project management.
- Distinguishing between **enduring** (products) and **ephemeral** (deliverables) outputs.
- Expanding the Federal Real Property Profile’s library of **use codes**.
- Accommodating **unique assemblies** not listed in industry standards.

MORE CHALLENGES

- Sharing **cost estimating relationships** between agencies.
- Detangling **projects** and **assets** (e.g., OMB M-20-03, Real Property Capital Planning).
- Explaining the Federal Real Property Profile's rolling **five year horizon** for collected capital costs.
- Communicating **plans** in a database oriented toward **actuals**.
- Parity between **real** and **personal** property (Federal Personal Property Management Act of 2018).



QUESTIONS?

PLEASE TYPE YOUR QUESTIONS INTO
THE CHAT BOX.