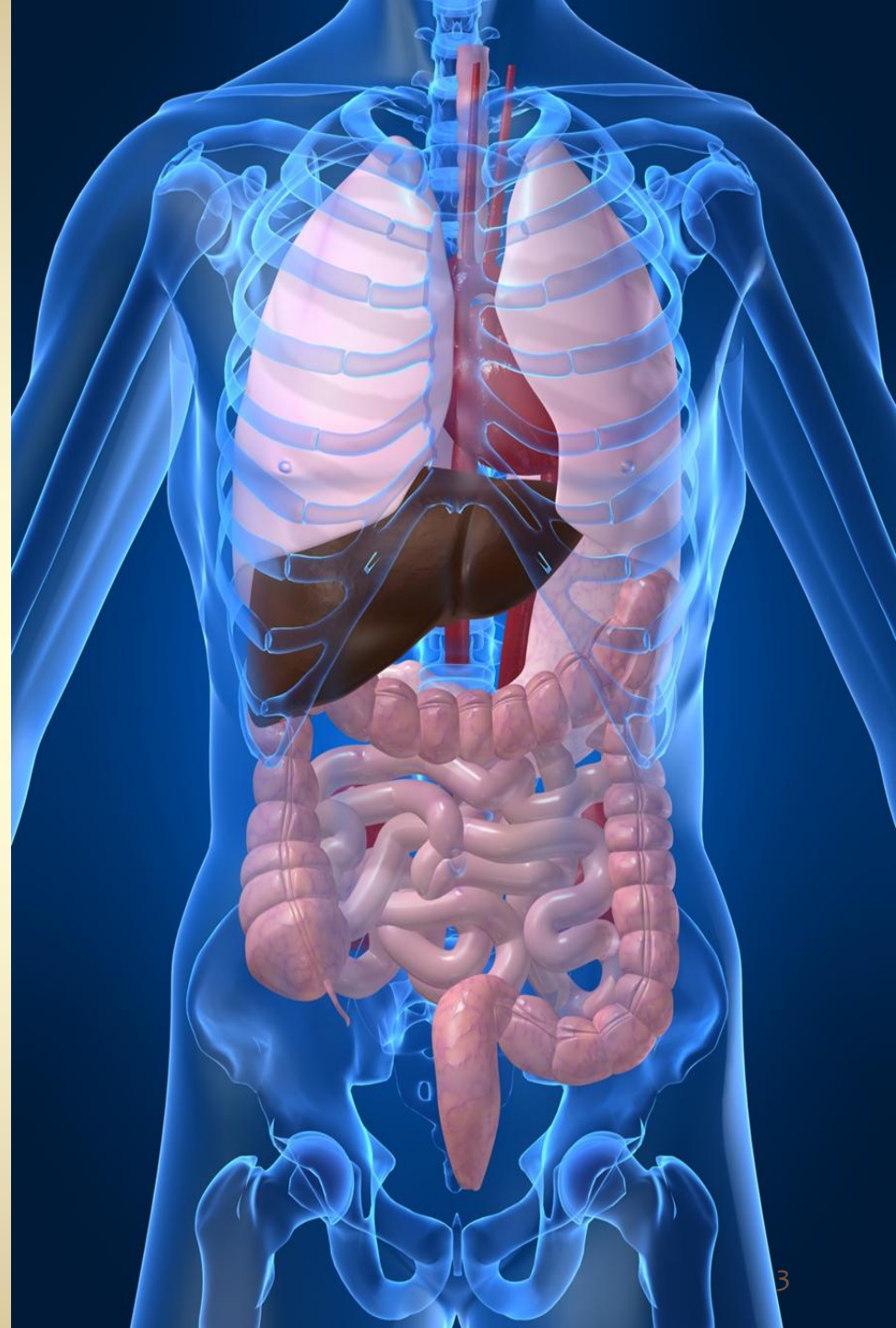# Work Breakdown Structures
The Project's Backbone

Presentation to
North Alabama Chapter of PMI

Bill Kessinger, PMP

19 June 2008

There is all this stuff that makes up a project. But, if the project structure is not sound, all the stuff will just spill out.

There are many tools and techniques for keeping the stuff under control. But if not employed in a meaningful way…the project is just a hollow shell and the stuff still spills out anyway.

What is a WBS?

- From the PMBOK: A deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project.

- From MIL-HDBK-881A: The Contract WBS is the Government-approved WBS for program reporting purposes and includes all product elements (hardware, software, data, or services), which are the contractor's responsibility. It includes the contractor's discretionary extension to lower levels, in accordance with Government direction and the Contract Statement of Work (SOW).

	❶	WBS	Task Name	Work Products	Predeces
1		1	⊞ Project Startup (PROJECT MANAGEMENT)		
33	📝	2	⊟ Proposal and Scope Definition		
34		2.1	⊞ Scope Business Transformation		
39		2.2	⊞ Define Requirements and Proof of Concept		
47		2.3	⊞ Determine Architectural Options and Decisi		
54		2.4	⊞ Scope Organizational Change		
58		2.5	⊞ Assess Application Fit and Interface Needs		
64		2.6	⊞ Assess Infrastructure Needs		
68		2.7	⊞ Adapt Asset for Demonstration Prototype		
76		3	⊟ Assessment and Planning		
77		3.1	⊟ Initiate Assessment and Planning		
78		3.1.1	Document Project Goals	Project Goals, Project Plan	75
79		3.1.2	Develop Work Plans and Procedures	Work Plan and Procedures	78
80		3.1.3	Assign Resources and Assets	Assigned Resources and Assets	79
81		3.1.4	Conduct Methodology Adoption Workshop	Project Workbook Outline, Risk List, Work Plan and Procedures	78
82		3.1.5	Establish Glossary	Glossary	78
83		3.1.6	Search for Intellectual Capital	Useful Intellectual Capital	78
84		3.2	⊟ Analyze Current Business Environment		
85		3.2.1	Confirm Scope of Business Processes	Process Selection	81
86		3.2.2	Assess As-Is Processes	As-Is Process Definition and Assessment	85
87		3.2.3	Collect Customer Requirements	Customer View and Requirements	85
88		3.2.4	Collect Leading Practices	Leading Practices	85
89		3.2.5	Confirm Business Strategy and Assess Indu	Business Strategy Assessment	86
90		3.2.6	Define To-Be Business Goals	Envisioned To-Be Business Goals	86
91		3.2.7	Establish Process Benchmarks	Process Benchmarks	86
92		3.2.8	Identify Critical Issues/Entry Points	Critical Issues/Entry Points	91
93		3.2.9	Carry out Sponsorship Assessment	Organization Change Readiness Assessment and Issues	89
94		3.2.10	Carry out Organizational Change Readiness	Organization Change Readiness Assessment and Issues	93
95		3.2.11	Establish Preliminary Cost/Benefit Analysis	Preliminary Cost/Benefit Analysis	94
96		3.2.12	Make and Review Recommendations and Pre	Recommendations and Preliminary Business Case	95,92
97		3.3	⊟ Develop Change Management Approach		
98		3.3.1	Plan Change Management	Change Management Plan	96
99		3.3.2	Develop Project Team	Project Team Development Plan	98
100		3.3.3	Produce Communications Plan	Communication Plan	98
101		3.3.4	Implement Change Management	Change Management Plan	100
102		3.4	⊟ Establish Basis for Organizational Developn		
103		3.4.1	Describe As-Is Organisation	As-Is Organizational Description	96
104		3.4.2	Assess As-Is Organization	As-Is Organization Assessment	103
105		3.4.3	To-Be Organization Design Scope	Scope of Organizational Redesign	104
106		3.4.4	Develop To-Be Organisation Design	To-Be Organization Design	105
107		3.5	⊟ Define Business Solution		
108		3.5.1	Conduct Training In To-Be Design Approach	Trained Students	106
109		3.5.2	Conduct Executive Visioning Session	Target Future Business Capabilities	106
110		3.5.3	Plan Focussed Business Package Training	Package Business Process Education	106
111		3.5.4	Briefing on Future Process Design Points	Briefed Team	110
112		3.5.5	Design High-Level To-Be Processes	enarios, Future Process Design Points, Future System Attributes	109
113		3.5.6	Perform High Level Fit/Gap Analysis	High Level Fit/Gap Analysis	112
114		3.5.7	Perform Asset Evaluation	Candidate Asset List	113
115		3.5.8	Develop Architecture Overview	Architecture Overview Diagram	113
116		3.5.9	Develop Future System Attributes	Future System Attributes	115
117		3.5.10	Design Detailed To-Be Processes	ess Scenarios, Future System Attributes, To-Be Process Design	116
118		3.5.11	Develop Solution Recommendation and Busir	Solution Recommendation and Business Case	117
		3.5.12	Develop To-Be Proof of Concept	To-Be Proof of Concept	118

Gantt Chart

A Level 3 Planning WBS for a Solutions Consulting and Integration Proposal

Contract WBS Example

MIL-HDBK-881A
APPENDIX C

C.3 WORK BREAKDOWN STRUCTURE LEVELS

| Level 1	Level 2	Level 3
Missile System	Air Vehicle	Propulsion (Stages I...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
	Systems Engineering/Program Management	
	System Test and Evaluation	Development Test and Evaluation
		Operational Test and Evaluation
		Mock-ups/System Integration Labs (SILs)
		Test and Evaluation Support
		Test Facilities
	Training	Equipment
		Services
		Facilities

WBS Fundamentals

- **The 100% Rule**
  - *The next level decomposition of a WBS element (child level) must represent 100 present of the work applicable to the next higher (parent) element.*

- **The following questions are asked at each level:**
  - *Does the sum of the work represented by the child elements equal 100 percent of the effort summarized in each parent element?*
  - *Is any work missing?*
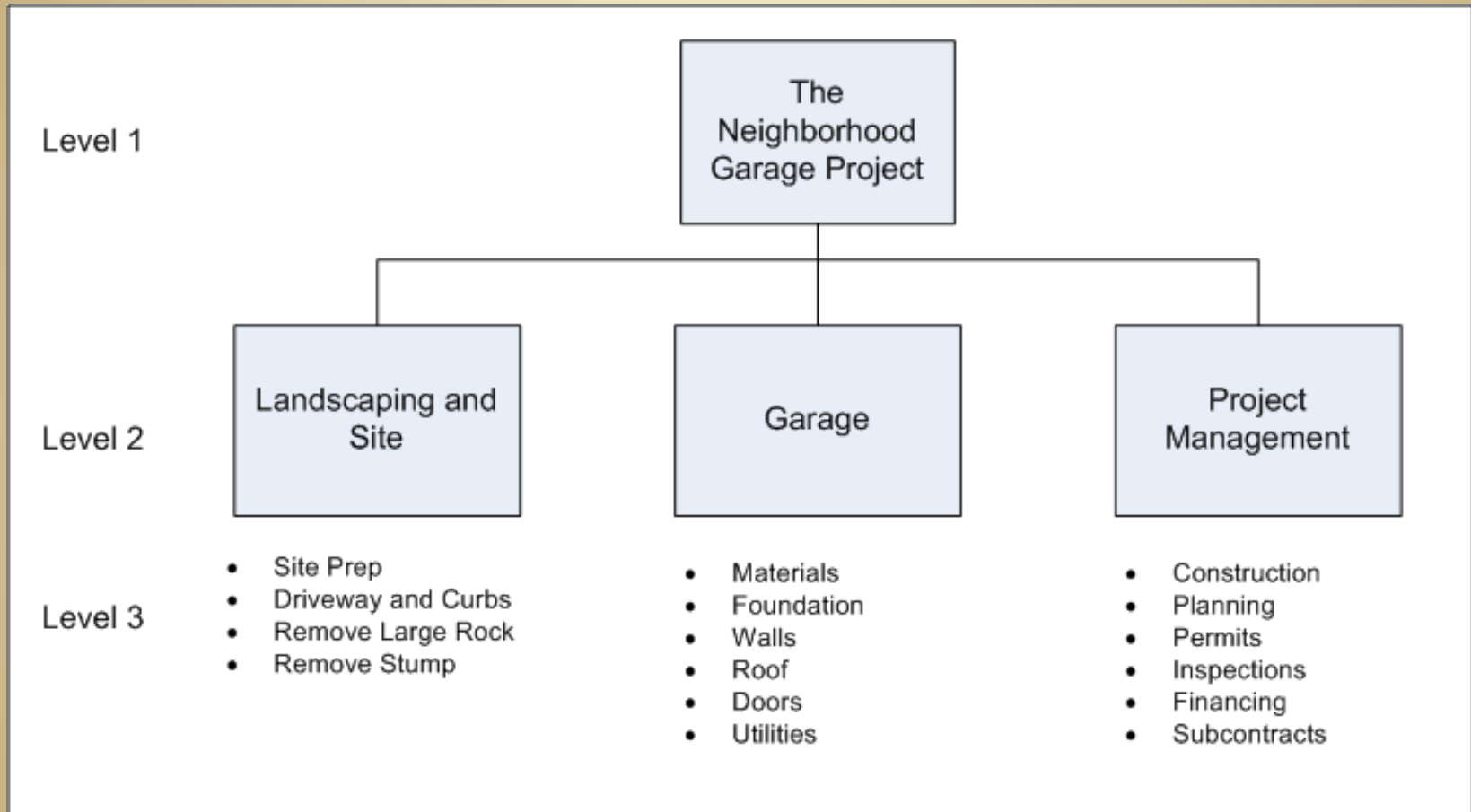
Managing & Controlling
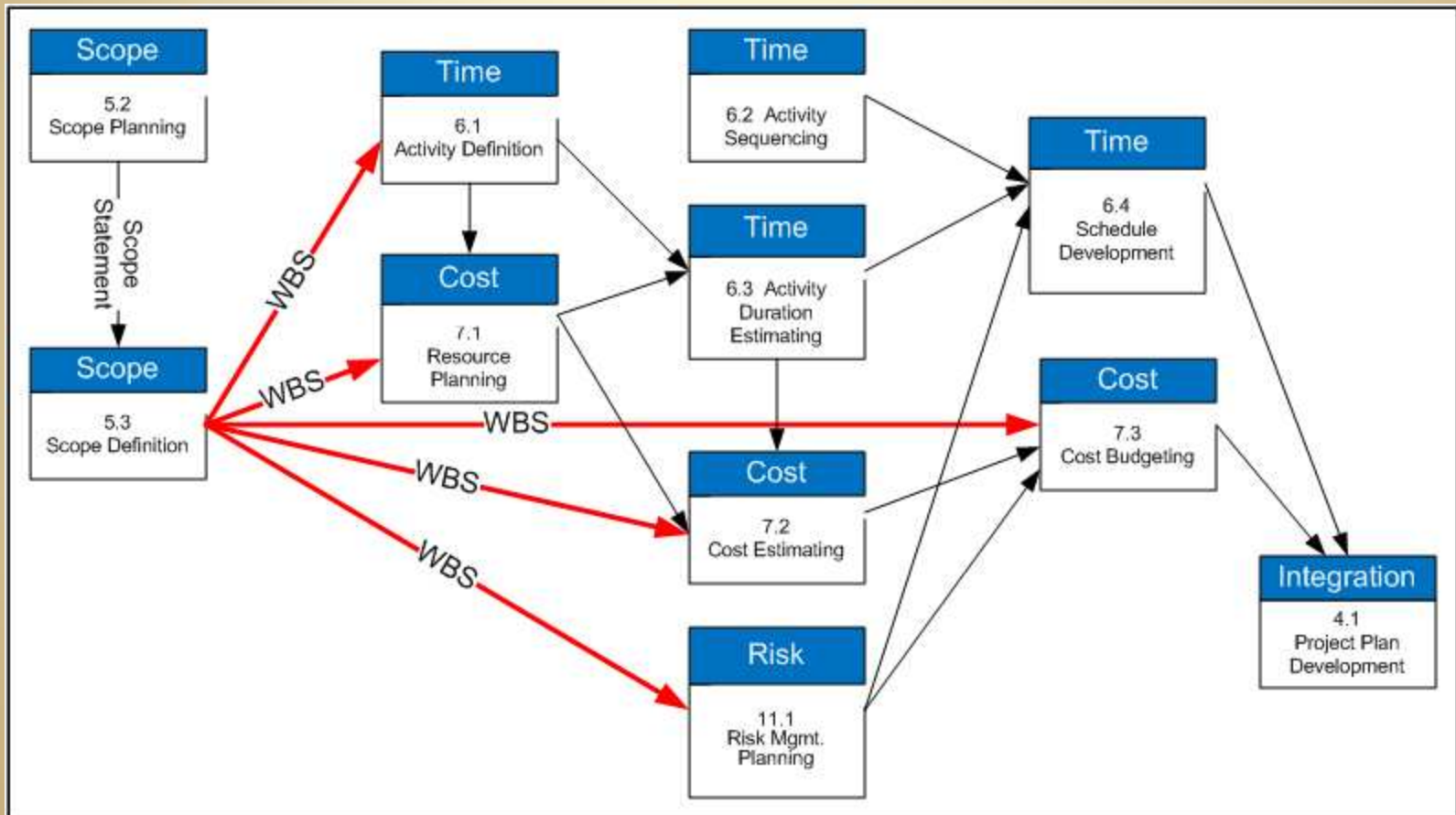
The Work Product Does Not Stand By Itself

Nonfunctional Requirements Work Product Description

1 Description

The **Nonfunctional Requirements** work product specifies the Nonfunctional Requirements that must be satisfied by the IT system.

Nonfunctional Requirements consist of:
- Service level requirements (SLRs), which are run-time properties that the system as a whole, or parts of the system, must satisfy. SLRs include:
  - Capacity and performance (volumetrics)
  - Availability
  - Security
  - System management

SLRs often need to be specified in terms of the parts of the system to which they relate, e.g., which use cases.

....

2 Purpose

The Nonfunctional Requirements work product is used:

- To define requirements and constraints on the IT system. Clear requirements are necessary for a successful project because they define the project's goals. They clarify what is needed and help keep the team focused.
- As a basis for early system sizing and estimates of cost.
- To assess the viability of the proposed IT system.
- To drive design of the operational models. Nonfunctional Requirements are frequently the most ....

2.1 Impact of Not Having This Work Product

2.2 Reasons for Not Needing This Work Product

3 Notation

Nonfunctional Requirements

Nonfunctional Requirements are expressed as attributes. Attributes describe a scale on which some property of the system can, in principle, be measured. The requirement may be that the value is above or below some target threshold or series of thresholds. For example, the required response time for a credit check in a financial system may be less than 20 seconds. Alternatively, the target may be 15 seconds on average with a maximum of 45 seconds. Attributes can represent many system characteristics and capabilities including response time, throughput, availability, reliability, data volumes, system size, and

Nonfunctional Requirements

4 Example

Nonfunctional Requirements (I

Nonfunctional Requirements for

- All queries must be complete
- All updates must be complet
- The system should support u
- MTTF (Mean Time To Failu

- ....

5 Development App

Nonfunctional Requirements (inc

- By extracting requirements f
- By eliciting requirements fro
- By eliciting requirements/co
....

6 Validation and Ver

7 Advice and Guidal

8 Estimation Consid

Nonfunctional Requirements can

onstraints include:

		WBS	Task Name	Work Products	Predec
1		1	⊞ Project Startup (PROJECT MANAGEMENT)		
33	📝	2	⊟ Proposal and Scope Definition		
34		2.1	⊞ Scope Business Transformation		
39		2.2	⊟ Define Requirements and Proof of Concept		
40		2.2.1	Document Business Case	Recommendations and Preliminary Business Case	35
41		2.2.2	Define Use Case Overview	Use Case Model	35
42	🌐	2.2.3	Define Key Nonfunctional Requirements	Non-Functional Requirements	40
43		2.2.4	Establish System Boundary	System Context Diagram	38
44		2.2.5	Prioritize System Requirements	Non-Functional Requirements, Use Case Model	41,42
45		2.2.6	Define Proof of Concepet Scope	Use Case Model	43,44
46		2.2.7	Review Risk List	Risk List	45
47		2.3	⊟ Determine Architectural Options and Decisi		
48		2.3.1	Review Candidate Assets	Asset List	46

6/20/2008

12

Work Product Standards

- Best guarantee for "project success on time, within budget, and meeting specifications" is the work product standard.

- Detailed standards communicating the who, what, when, where, and how for work product execution

- Enables project attribute reuse and capture of lessons learned

WBS No.	Title		SOW	Specification	CDRL	CLIN

Date **Revision No.** **Revision Authorization** **Task Description**

0 _____

1 _____

2 _____

3 _____

Inputs   **Subtasks / Activities / Milestones**

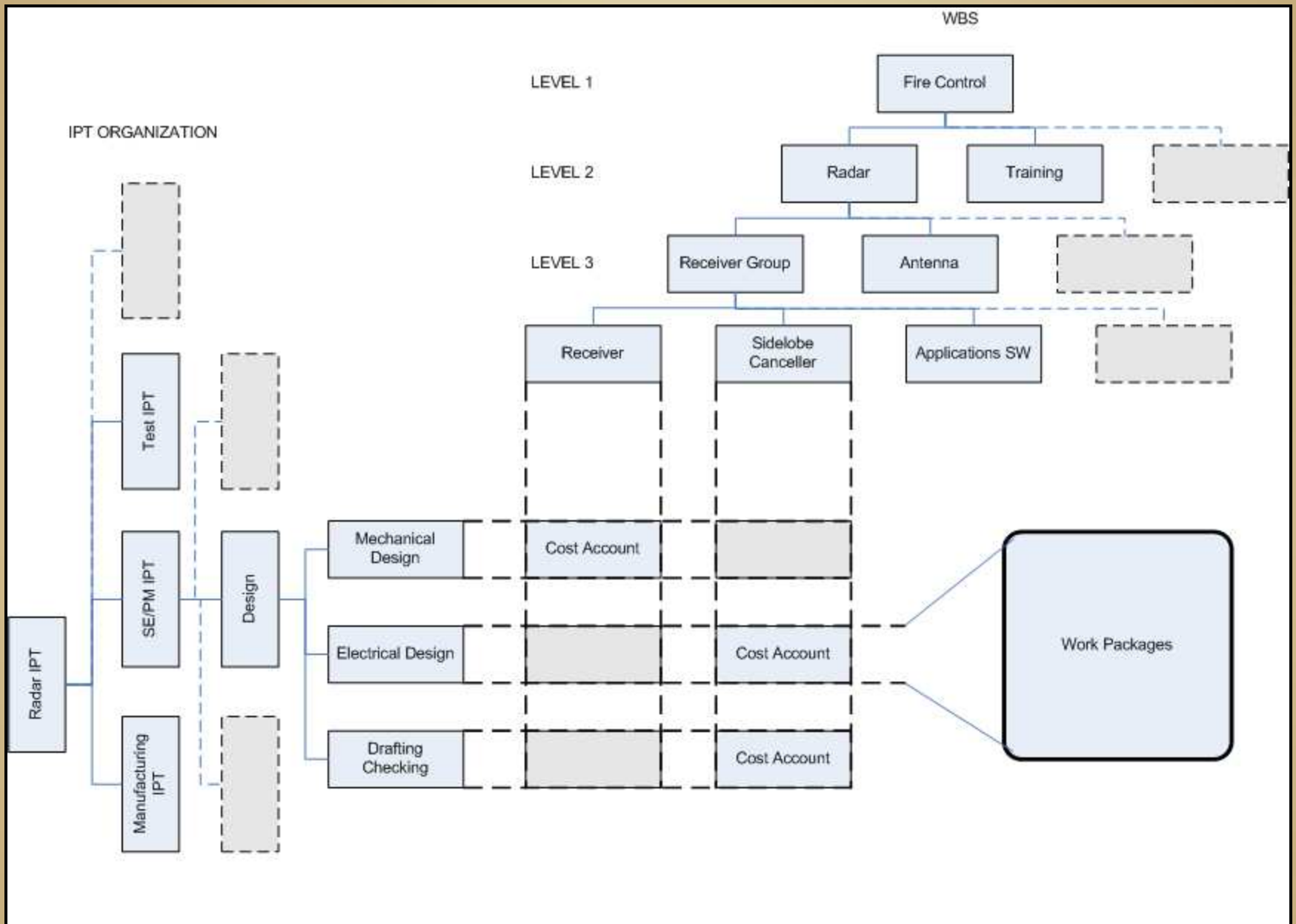**Outputs**   **Assumptions**

Successor Tasks
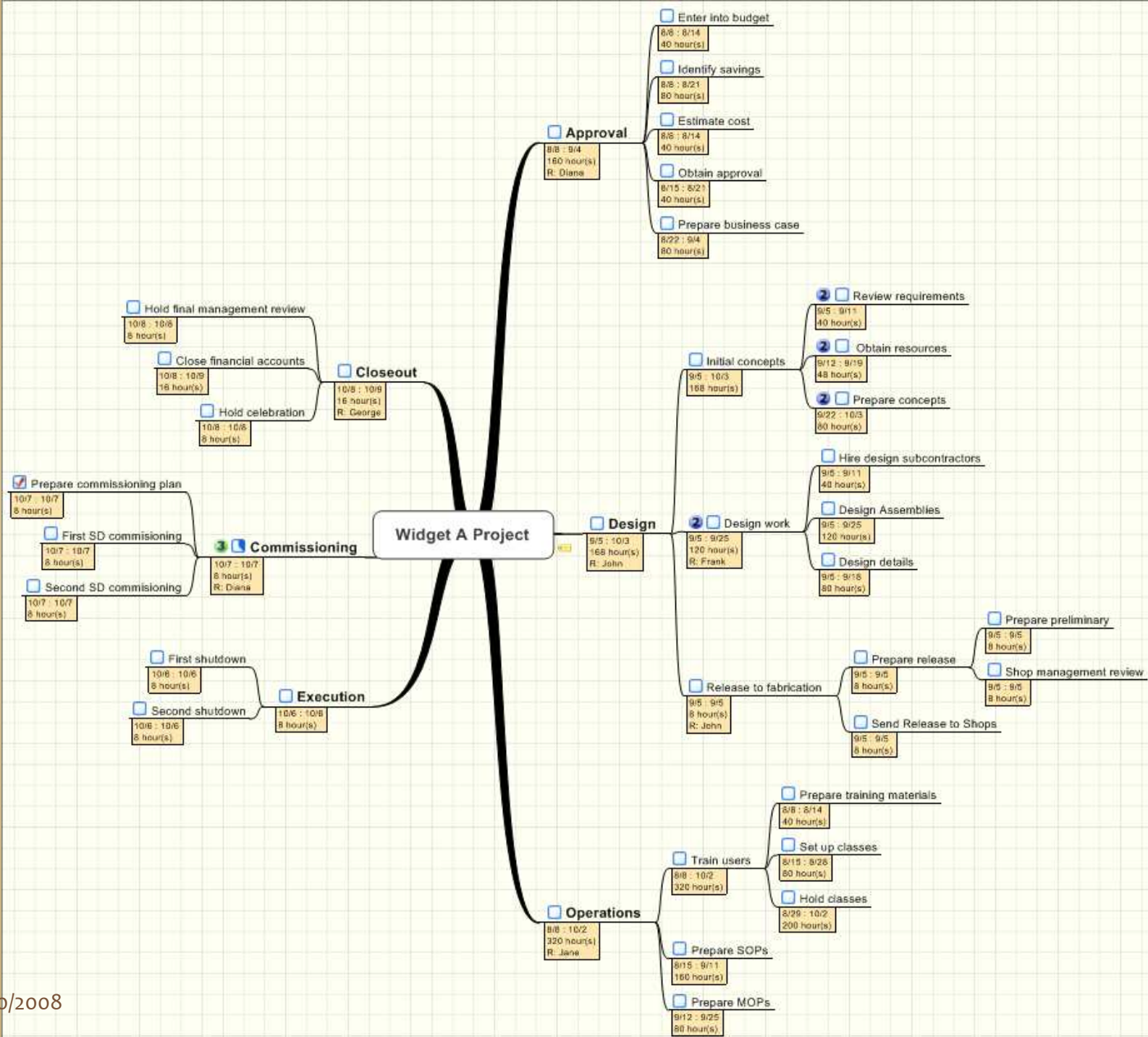
Task Period of Performance   **Labor Category**   **Hours**   **Midpoint of Effort**

Type of Task & EVM Method

IPT Intersection with WBS

Widget A Project

- **Approval** — 8/8 : 9/4 — 160 hour(s) — R: Diane
  - Enter into budget — 8/8 : 8/14 — 40 hour(s)
  - Identify savings — 8/8 : 8/21 — 80 hour(s)
  - Estimate cost — 8/8 : 8/14 — 40 hour(s)
  - Obtain approval — 8/15 : 8/21 — 40 hour(s)
  - Prepare business case — 8/22 : 9/4 — 80 hour(s)

- **Design** — 9/5 : 10/3 — 168 hour(s) — R: John
  - Initial concepts — 9/5 : 10/3 — 168 hour(s)
    - Review requirements — 9/5 : 9/11 — 40 hour(s)
    - Obtain resources — 9/12 : 9/19 — 48 hour(s)
    - Prepare concepts — 9/22 : 10/3 — 80 hour(s)
  - Design work — 9/5 : 9/25 — 120 hour(s) — R: Frank
    - Hire design subcontractors — 9/5 : 9/11 — 40 hour(s)
    - Design Assemblies — 9/5 : 9/25 — 120 hour(s)
    - Design details — 9/5 : 9/18 — 80 hour(s)
  - Release to fabrication — 9/5 : 9/5 — 8 hour(s) — R: John
    - Prepare release — 9/5 : 9/5 — 8 hour(s)
      - Prepare preliminary — 9/5 : 9/5 — 8 hour(s)
      - Shop management review — 9/5 : 9/5 — 8 hour(s)
    - Send Release to Shops — 9/5 : 9/5 — 8 hour(s)

- **Operations** — 8/8 : 10/2 — 320 hour(s) — R: Jane
  - Train users — 8/8 : 10/2 — 320 hour(s)
    - Prepare training materials — 8/8 : 8/14 — 40 hour(s)
    - Set up classes — 8/15 : 8/28 — 80 hour(s)
    - Hold classes — 8/29 : 10/2 — 200 hour(s)
  - Prepare SOPs — 8/15 : 9/11 — 160 hour(s)
  - Prepare MOPs — 9/12 : 9/25 — 80 hour(s)

- **Execution** — 10/6 : 10/6 — 8 hour(s)
  - First shutdown — 10/6 : 10/6 — 8 hour(s)
  - Second shutdown — 10/6 : 10/6 — 8 hour(s)

- **Commissioning** — 10/7 : 10/7 — 8 hour(s) — R: Diana
  - Prepare commissioning plan — 10/7 : 10/7 — 8 hour(s)
  - First SD commisioning — 10/7 : 10/7 — 8 hour(s)
  - Second SD commisioning — 10/7 : 10/7 — 8 hour(s)

- **Closeout** — 10/8 : 10/9 — 16 hour(s) — R: George
  - Hold final management review — 10/8 : 10/8 — 8 hour(s)
  - Close financial accounts — 10/8 : 10/9 — 16 hour(s)
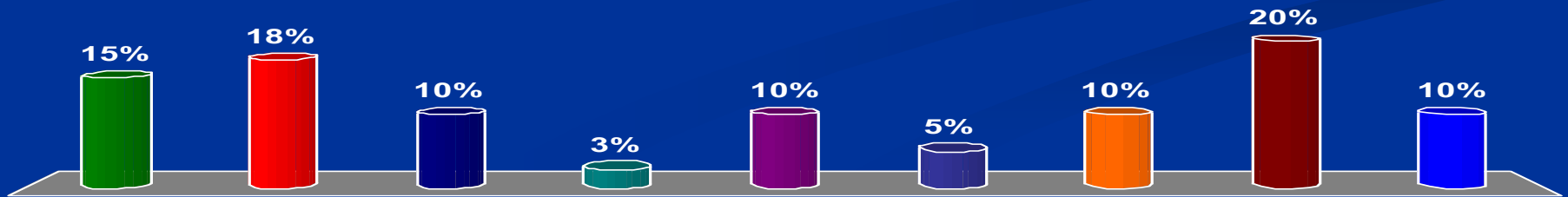 - Hold celebration — 10/8 : 10/8 — 8 hour(s)

What's Next?

- Review your projects methodologies for WBS enhancement opportunities
- Investigate the value of Work Product Standards
- See the value of using the WBS as a management and control tool
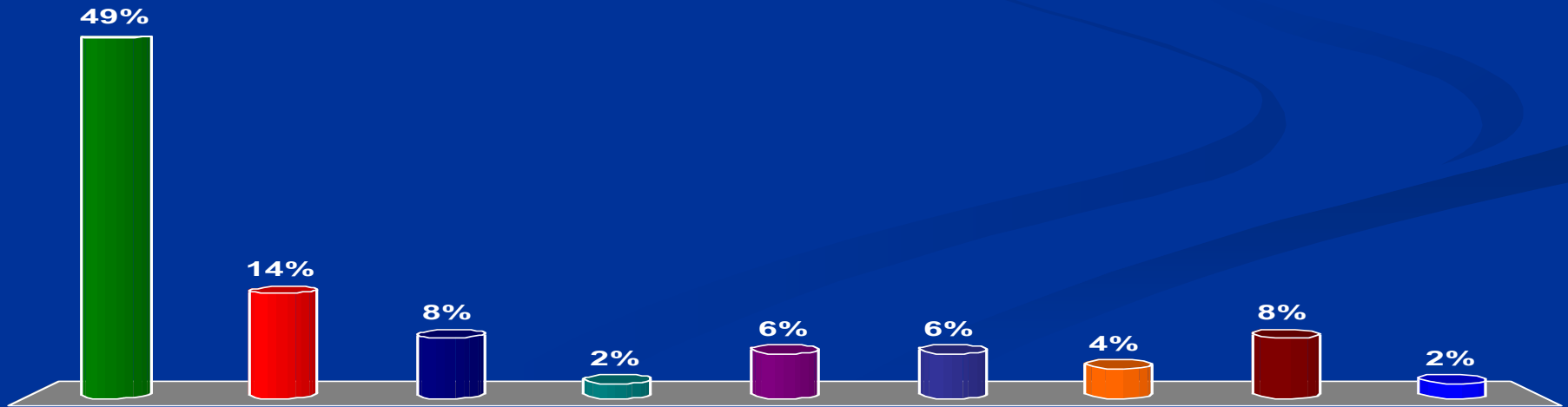
- Questions

We create and use a WBS . . .

Never   Always

1   2   3   4   5   6   7   8   9

15%   18%   10%   3%   10%   5%   10%   20%   10%

How much do you use a company specific WBS dictionary?

Never　　　　　　　　　　　　　　　　　　　　　　　**Always**

1	2	3	4	5	6	7	8	9

49%

14%

8%

2%

6%

6%

4%

8%

2%

Our clients require that we use a WBS . . .

Never   **Always**

1   2   3   4   5   6   7   8   9

33%   10%   12%   0%   18%   6%   4%   8%   10%
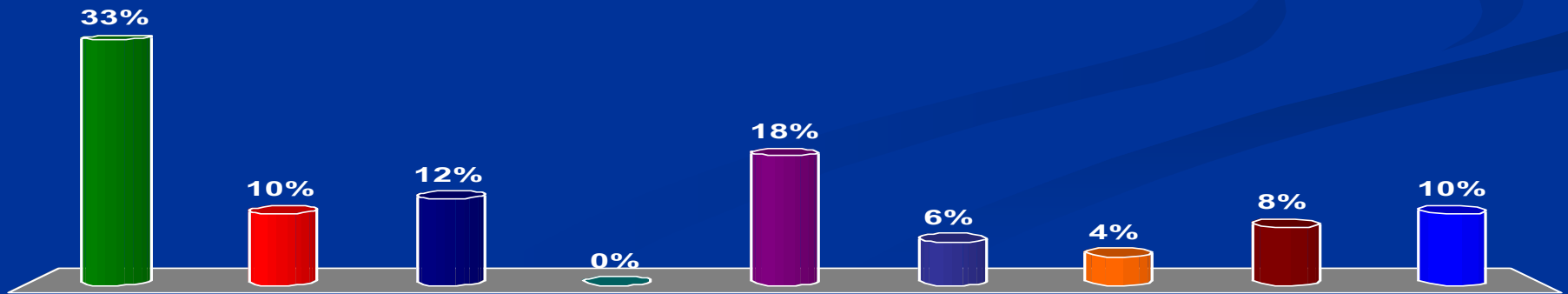
On your projects,
how precise is your WBS?

No formal
WBS

Critical

1   2   3   4   5   6   7   8   9

25%

10%

10%

16%

10%

6%

12%

8%

4%
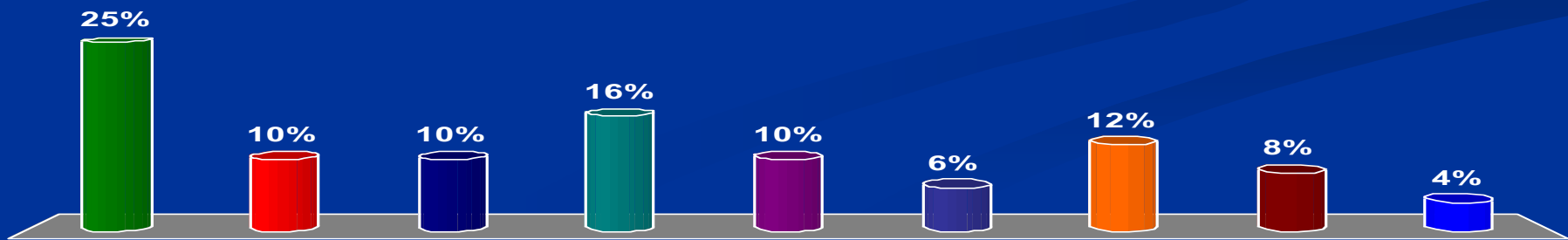
Do you routinely develop a work package level in your WBS?

1. Yes
2. No
3. Huh?

26% **41%** **33%**

1   2   3
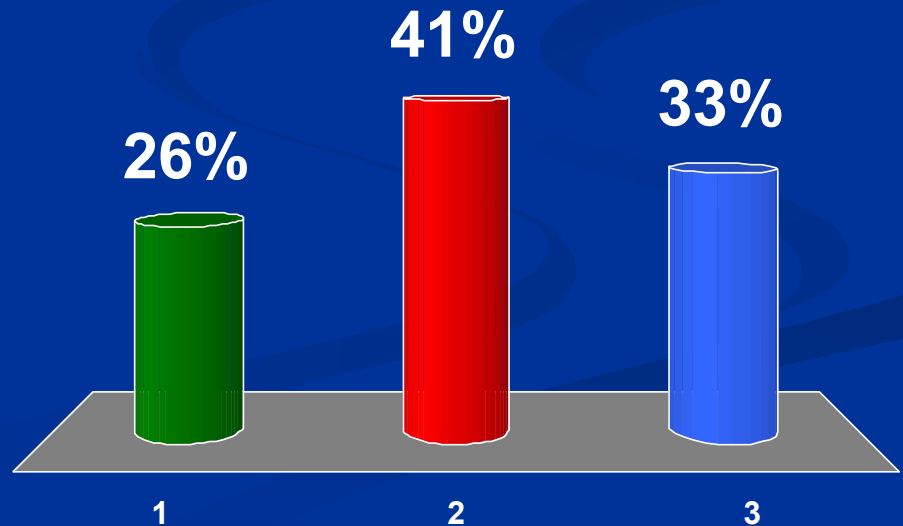
Is there a Project Management element at Level 2?

1. Yes
2. No
3. Only if you want one.
4. There is no level 2.
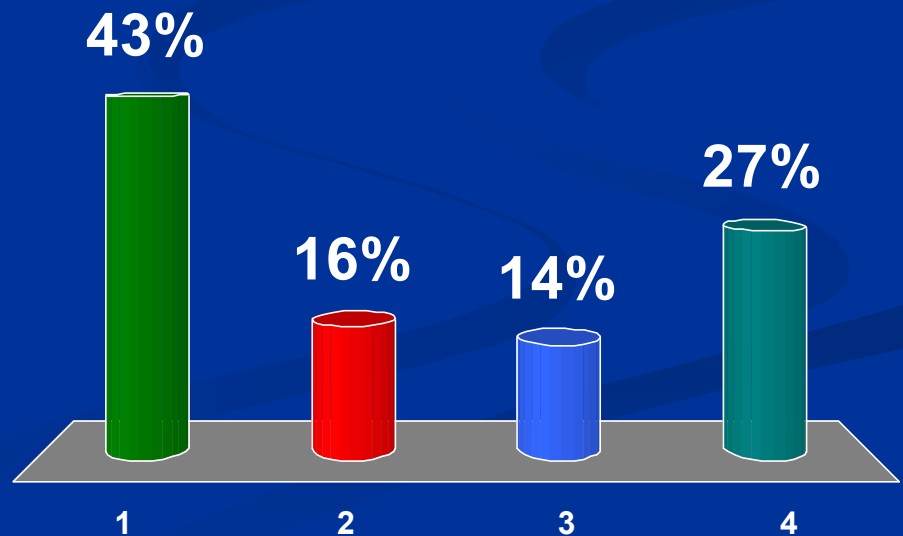
After studying about the WBS, my understanding of how to apply WBS to an actual project is:

Fuzzy

Precisely understood

1   2   3   4   5   6   7   8   9

| | | |
2%   0%   19%   11%   21%   11%   15%   11%   11%