Work Breakdown Structures

Embedded Interface Design

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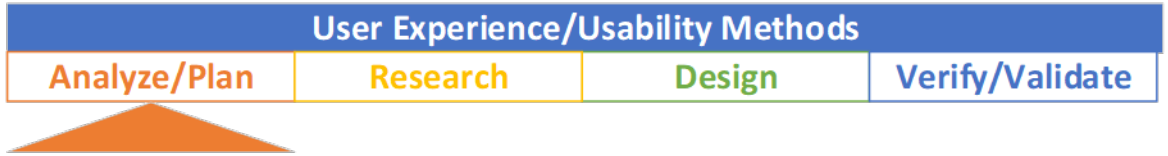
Learning Objectives

Students will be able to…

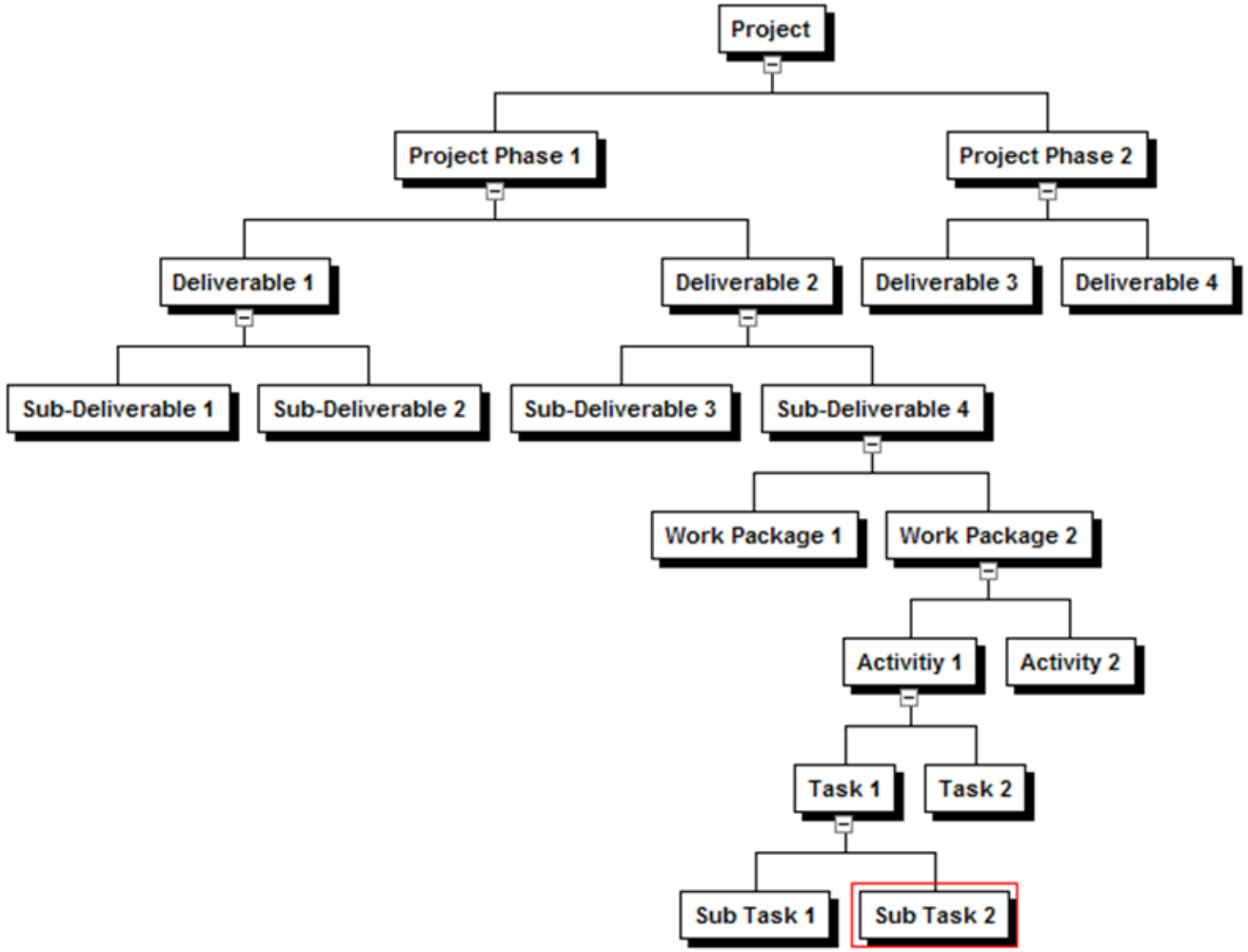
- Understand what a WBS is and when it's used
- Recognize the best practices for WBS development
- Consider and apply different tools for WBS development
- Consider various additional uses for a WBS

Work Breakdown Structures



- Time: one or more hours, depending on complexity
- Goals: planning, communications
- A WBS (Work Breakdown Structure) is
  - A deliverable-oriented hierarchical decomposition of work to accomplish objectives or create deliverables (internal or external)
  - It defines the total scope of a project or project phase
  - Each level deeper in a WBS represents increasing detailed definition of project work
- The WBS is decomposed into work packages
- Process originally comes from the DOD & NASA in the 1960s [1]

Work Breakdown Structures - Graphical



- A complex graphical WBS example, including phases, deliverables, sub-deliverables, work packages, activities, tasks, and sub-tasks

Work Breakdown Structures – Textual/Outline

1 Project
1.1 Phase 1
1.1.1 Deliverable 1
1.1.1.1 Sub Deliverable 1
1.1.1.2 Sub Deliverable 2
1.1.2 Deliverable 2
1.1.2.1 Sub Deliverable 3
1.1.2.2 Sub Deliverable 4
1.1.2.2.1 Work Package 1
1.1.2.2.2 Work Package 2
1.1.2.2.2.1 Activity 1
1.1.2.2.2.1.1 Task 1
1.1.2.2.2.1.1.1 Sub Task 1
1.1.2.2.2.1.1.2 Sub Task 2
1.1.2.2.2.1.2 Task 2
1.1.2.2.2.2 Activity 2
1.2 Phase 2
1.2.1 Deliverable 3
1.2.2 Deliverable 4

- The same WBS example as previously shown, this time presented as a textual outline view. Each line number represents that elements position in the project structure.

Why a WBS matters

- A successful project manager must focus on deliverables!
  - what are all of the project deliverables
  - what has to be done or produced to create them
  - who is responsible
  - when is it due
  - what does it cost
  - what is the acceptance criteria

- Thorough **identification of project scope and deliverables** provides for a better chance of a successful delivery

Why a WBS matters

- The WBS process also provides for **team building and buy-in** through confirming a common understanding of project scope and deliverables
- A WBS **reduces scope creep** by gathering and reviewing all requirements from all stakeholders, and provides a baseline for future change control
- The WBS supports communication, estimation, confidence, and **control of project deliverables**

WBS Best Practices

- The focus of creating a project WBS should be on scope and deliverables, not on time, resources, or other concerns
  - Focus on the what initially, not who or when
- The 100% rule: a project WBS should represent 100% of the work and deliverables within scope of the project
  - Anything not in the WBS is considered out of scope
- A project WBS should include all cross-functional areas that impact the deliverables – including project management tasks that occur in the project (presentations, reporting, etc.)

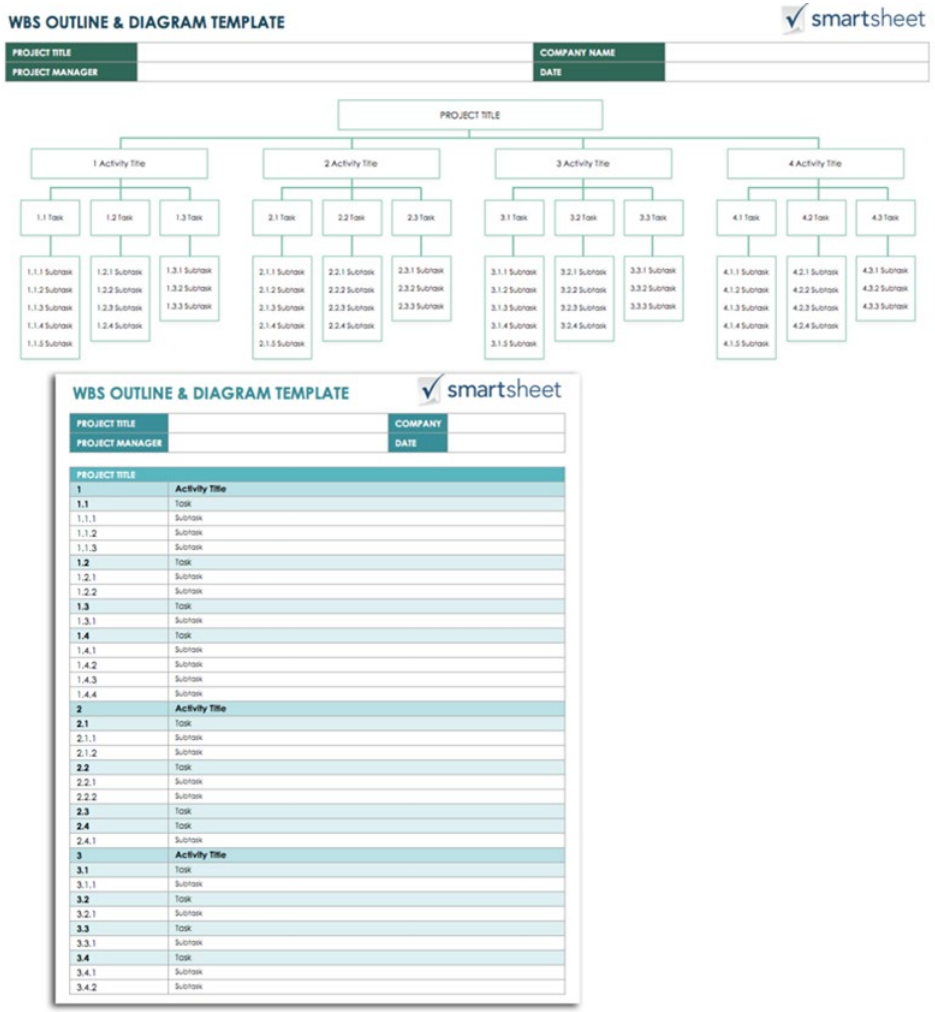
WBS Best Practices (2)

- Ideally, the lowest level of an WBS should consist of elements that can be managed, estimated, and measured
- Clearly identify deliverables (nouns not verbs)
- Each element represents a single deliverable (internal and external)
- Items that are considered high cost or high risk should be further decomposed

WBS Best Practices (3)

- The 80-hour rule: each low level task should be 8-80 hours in duration
- Where possible, limit each new level to 5-7 elements (for readability) – this may require addition of summary tasks or other breakdowns
- Like all project documents, the WBS should be version controlled and reviewed regularly by stakeholders
- Create the WBS jointly with the project team – for ownership and team building
- The WBS should be reviewed before a schedule is created

How is a WBS Organized or Presented?



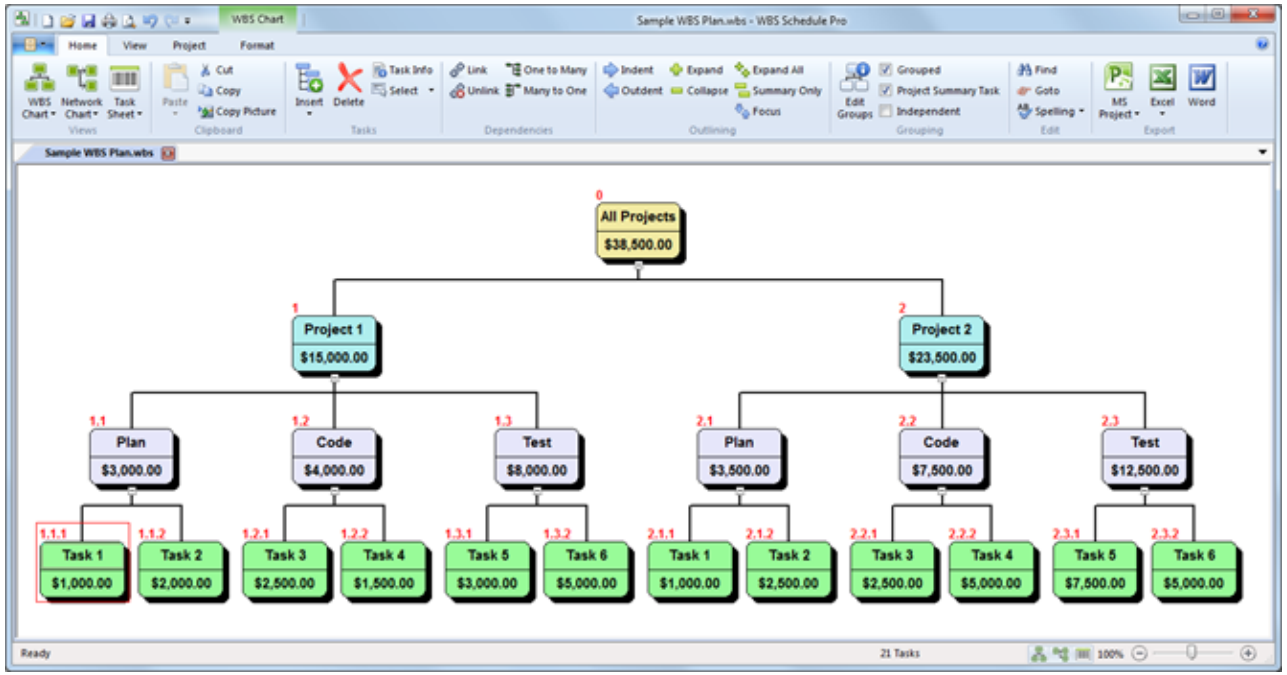
- The levels in a WBS depends on the scope of the WBS…
- For a typical UX effort, you may be focused on just Activities, Tasks, Sub-tasks
- Can include Projects, Phases, Deliverables, Work Packages
- Choose from a graphical or a textual/outline approach – may be driven by the tool used

WBS Best Practices (3)

- We'll do this together…
- WBS for Project 2
- Deliverables
- Tasks/Sub-Tasks – What (most important), then who/how long
- T-Shirt Sizing
  - Small = <1 Hour
  - Med = 1-2 Hours
  - Large = 2-4 Hours
  - XL = 4-8 Hours
  - XXL = More than a day (break this task up)

Suggested WBS Tools

- Whiteboard & camera – easy, free!
- Specialized App
  - WBS Schedule Pro
- Web tools
  - WBS Tool
  - Plan Hammer
- Word/Excel
  - Smartsheet Templates
  - My Word Templates
- Visio
  - Brainstorming Diagram
  - WBS Modeler for Visio
- Mind-mapping tools
  - Mindmeister
  - XMind



From WBS to Agile Stories or Effort Estimates

- It's easy to take the sub-tasks in a WBS (the bottom layer of work packages) and create stories or deliverables for an agile Scrum or Kanban tracking tool
- Tasks can be "t-shirt sized" for initial estimates of project resource needs [5]
  - T-shirt sizing: set effort durations to Small/Medium/Large/XL type categories – allows a roll up for resource and timing prior to detailed planning
- Tasks can easily be assigned to resources on the project
- Or missing resources can be identified

The WBS in Use

- A WBS will be more accurate if you drive to tasks that are small and owned by one person
- It's a very strong tool for estimating – because of the bottom up approach
  - If you've used T-Shirt sizes for tasks, rolling up an estimate is simple
  - You could also do a similar task cost roll-up for a preliminary budget
- It's a great tool for alignment on the actual work that is being asking for compared to what you're planning to do

The WBS in Use

- You could use a WBS to track progress without using other tools
  - But usually you'll go to stories or cards to track in a Scrum or Kanban
  - Or move the tasks into something like a Microsoft Project Gantt chart or similar project scheduling tool
- For more information, see the PMI's WBS practice standard [1]
- The CDC web site also provides a WBS use guideline [3] and templates, examples, and checklists [4]
- Remember, understanding and controlling deliverables is your best path to a successful project

References

[1] Practice Standard for Work Breakdown Structures (2nd Ed.), 2006, Project Management Institute
[2] Work Breakdown Structures: The Foundation for Project Management Excellence, 2008, Norman, Brotherton, & Fried
[3] WBS Practices Guide, 2006, CDC (Centers for Disease Control), http://www2.cdc.gov/cdcup/library/practices_guides/CDC_UP_WBS_Practices_Guide.pdf
[4] http://www2.cdc.gov/cdcup/library/matrix/default.htm under Work Breakdown Structure
[5] https://medium.com/radius-engineering/project-estimation-through-t-shirt-size-ea496c631428