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Work Breakdown Structure (WBS): A Helpful Illustrated Guide

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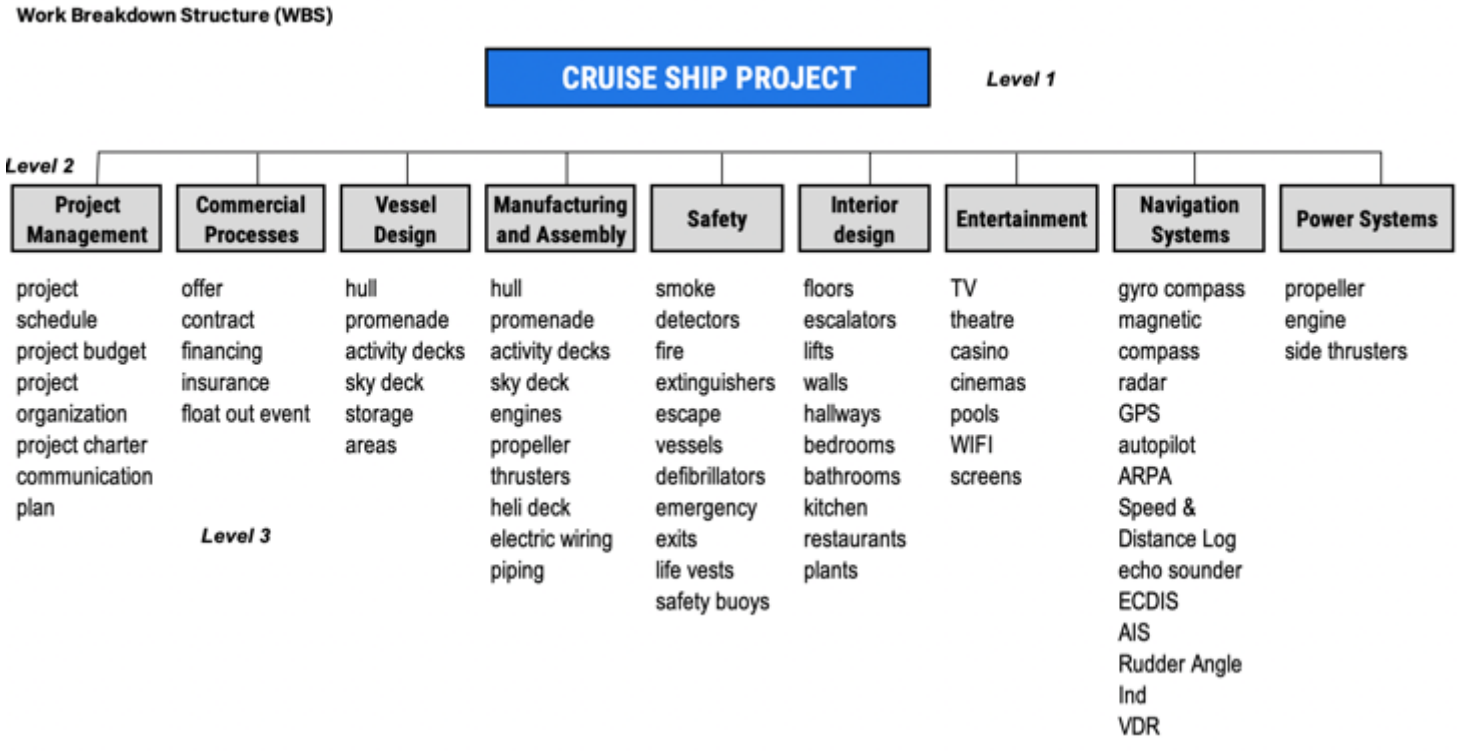
11–14 minutes

When you're getting involved in project management and start to study the literature, there's a term you often come across. It's the so-called work breakdown structure or WBS in short. In this article you'll learn what this concept is about and how to use it in your projects.

What is a work breakdown structure?

A work breakdown structure (WBS) is a graphical chart which shows all the parts a project has to deliver in order to meet the project goal. It is used to identify all project deliverables and necessary activities. *A deliverable basically is the end result or product of a task. An example would be the finished design model for a ship.* The way a WBS works is you break down your project into smaller, manageable chunks. This is where the term is coming from. The project work is shown in a hierarchical, multi level visual structure.



Why we use work breakdown structures — an example

To understand why WBS are very helpful, picture the following project: You are responsible for building a new cruise ship. That's a huge project

and it will take at least 3 years to complete. It involves so many activities — from creating the drawing to building the ship to interior design and rollout (curious how a ship is built?)

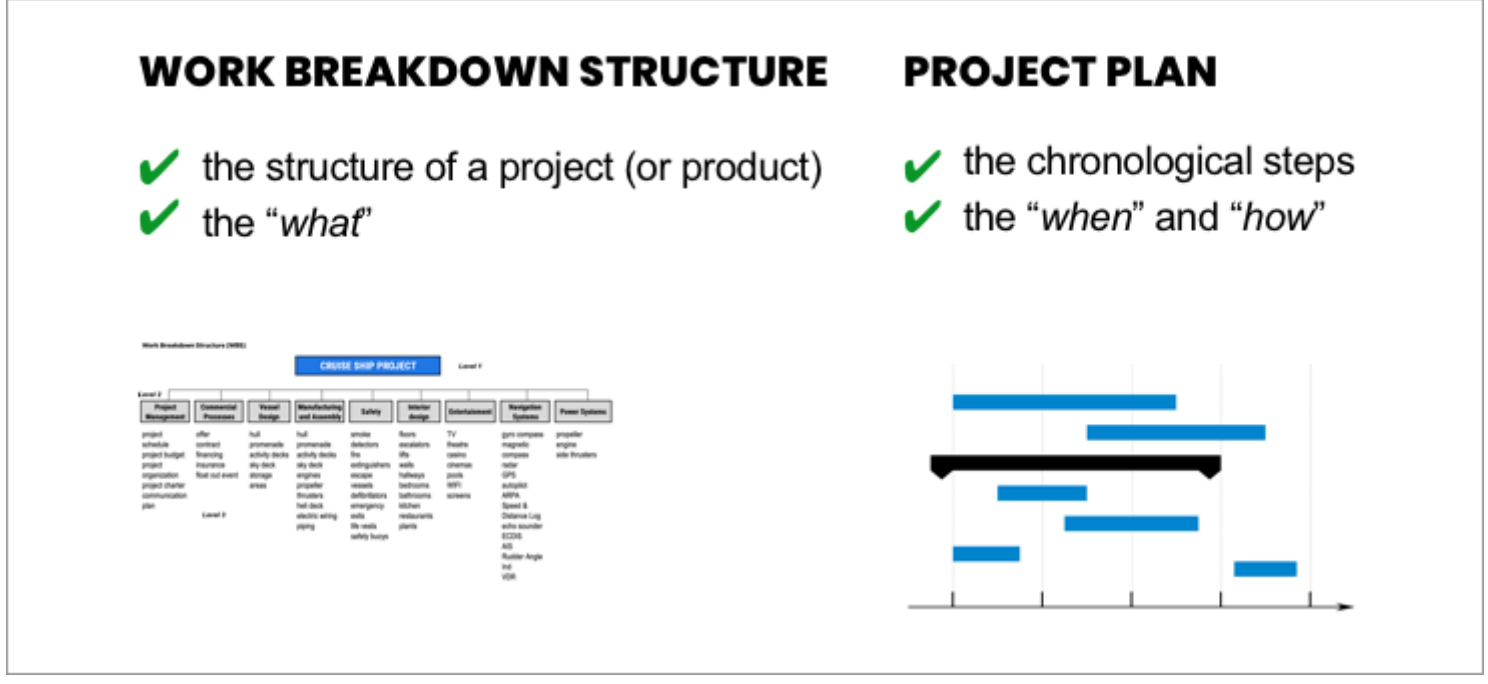
Now your job is to create a rock-solid project plan. But how can you accomplish that? A cruise ship consists of **a million parts** and there are **thousands of steps** needed. How can you make sure you don't miss anything? The only way you can handle such a project is by breaking it down into smaller parts and then looking at each part separately. And that's why we create work breakdown structures (WBS).

Benefits of creating a WBS

A WBS helps to identify necessary project work. It's a different way to look at your project, much like a puzzle. You try to find all the pieces that make up the big picture, and only when you've gathered all pieces will the puzzle be complete. Or, applied to project management: only when you have a complete overview of all necessary work will you be able to complete your project successfully. Once you know all tasks, you can create a project plan and get your team to start the work. Speaking about a project plan, you may be asking yourself:

What's the difference between a WBS and a project schedule?

Very simple. As I wrote before, the main reason for creating a work breakdown structure is to understand what tasks and deliverables a project has to take care of. We are not doing any planning here. It's really just to understand the structure of a project — like you would try to understand the structure of a machine. A project plan on the other hand is created to allocate project work on the timeline. It helps you see ***when*** a certain activity will be carried out. The schedule is also continuously update as the project progresses whereas the WBS is more static. You create it once, pin it to your wall and that's it.



So, how are the WBS and the project schedule connected? The WBS elements are mapped onto the project plan. But not in their original form. An item like 'radar' on the WBS would appear on our schedule as an action item, like *Install radar system*. Of course the schedule would be very detailed, containing activities around the design, development and testing of our radar: *Design radar system, Implement radar system, Radar system test* and so on. You get the point. Enough of the theory! Let me show you how you create an actual WBS.

How to create a WBS

We'll use our ship building project as an example.

Step 1: Clarify the Project Scope

You can only create a WBS once you have a clear understanding of what you are supposed to do. With that I mean what the project is expected to deliver, create or change. This is defined in the project scope. For our cruise ship project, the scope would be defined in some sort of specification for the vessel. It would contain a description of the ships purpose, capacity, planned routes, required entertainment facilities and so on. Using this information you can derive a suitable work breakdown structure.

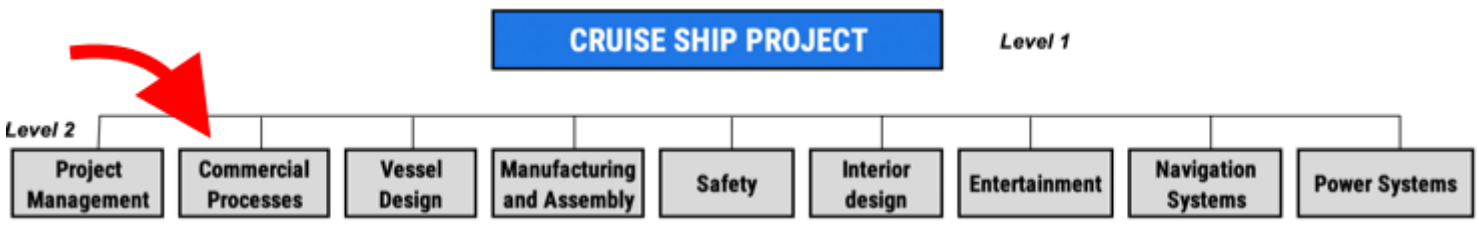
> **What is project scope?**
>
> Scope is what a project is supposed to deliver, create or change.

Knowing your scope matters also for another reason: The scope also states what does *NOT* fall into your project's responsibility. Let's assume the cruise ship is supposed to roam in warm areas near the equator only. Therefore, you would not need an ice-resistant hull that a vessel roaming

the arctic sea would need. On the other hand there may be parts of the ship that will be provided by a subcontractor. For example the vessel's engine. You therefore would not have to plan the engine's assembly down to the last screw. Conclusion: The scope determines the content and depth of a WBS. If you are unclear about the scope, talk to the customer or project sponsor.

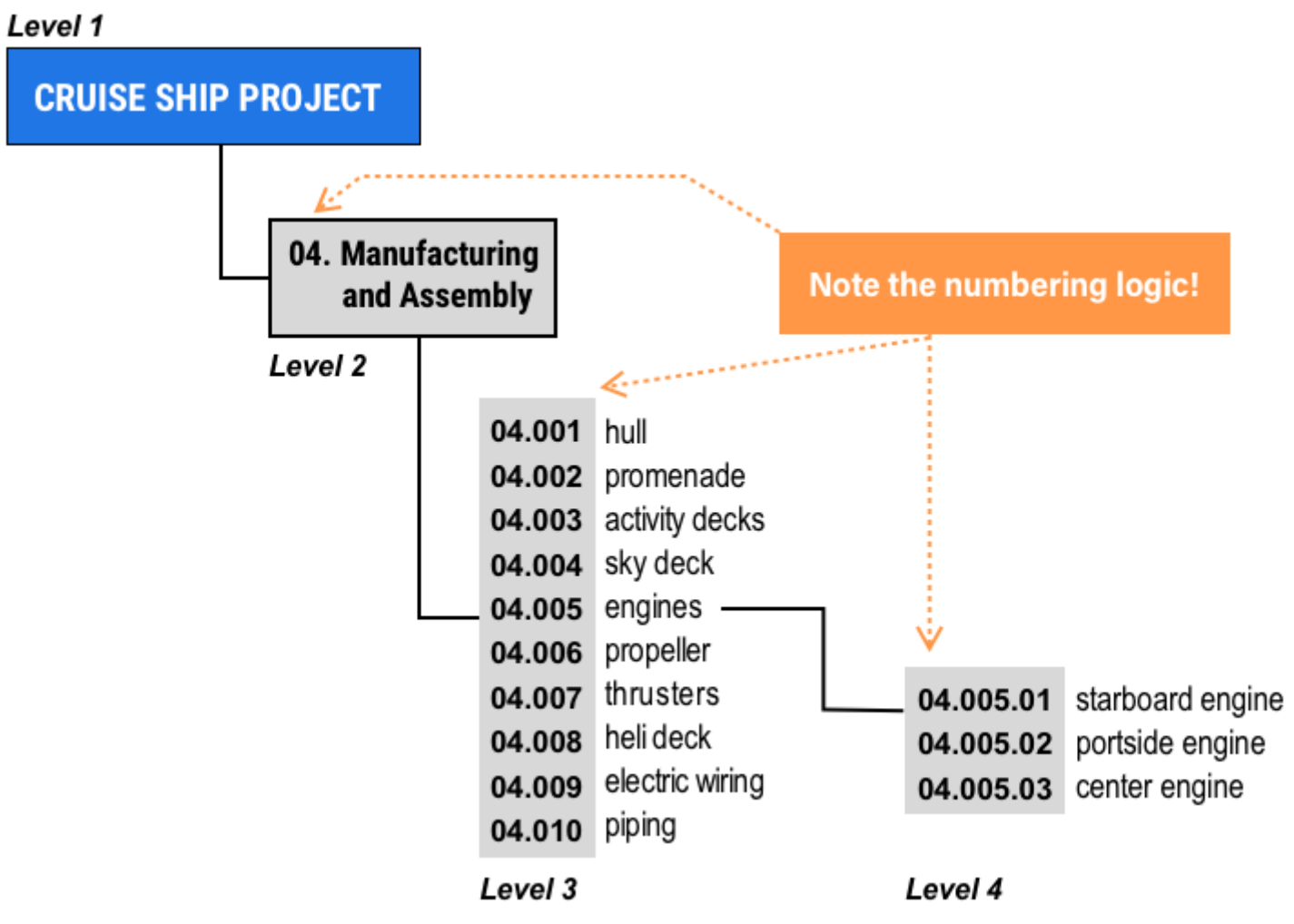
Step 2: Record the main deliverables

Next you write down the main areas of work. These are the high-level tasks your project is taking care of. For our example this would be vessel design, manufacturing, interior design, safety and more. Note that there's also a work package called *project management*. This includes all work around project planning and organization.



Step 3: Break work packages further down (and repeat)

Once you have gathered the main work packages, you have to break each package further down until you arrive at a level where you have sub tasks and tangible deliverables that you can assign to somebody in your team. For example, here I broke down the engine part. This is what a Work Breakdown Structure looks like. The items on the lowest level — vertical and horizontal steering systems, stabilization systems etc. — can now be given into the hands of a team of engineers. **Engine Work Breakdown Structure:**



In the example you can also see the **numbering logic** typically used in a WBS. Each element is assigned a **unique code**. This makes it easier to identify elements and helps to avoid misunderstandings. As you've probably noticed, the numbering system matches the hierarchical structure. The deeper you go on a WBS, the more dots the codes will have. You need to do this breakdown for every area of work such as project management, interior design, safety and so on. **The purpose of creating a WBS is to have a complete overview of all necessary project tasks**.

How detailed should your WBS be?

There's no general rule, but there are a two questions you can ask yourself to see whether you've gone down the rabbit hole deep enough:

- **Do you feel confident enough to create a detailed project plan with clear action steps?** If the answer is no, you need to break up the WBS further.
- **What's the estimated effort of the lowest level elements?** Suppose you have a deliverable called *electrical wiring* at the lowest level. This includes ALL electrical wiring work in the vessel. In total, let's say 150 person days of work. That's huge and almost a project of its own! In this case it's better to break work further down. For example: electrical wiring ground level, 1st level, 2nd level, sky deck etc. This way you get work packages that you can assign to someone in your team.

  Remember: A WBS is supposed to help you. I know you are a

perfectionist and you want to get the WBS right. Don't fall into the perfectionist trap though. A WBS is supposed to help you and not cause you a headache. Spend as much time on it as you need to get a good feel for your project. And then move on to plan your project.

Is your WBS good enough?

So far we've talked about why work breakdown structures are useful, how to create them and what level of detail you should aim for. This is all important information. But you still may be wondering how to know if your WBS is good enough or if it requires more refinement. To help you with that question, here's some more advice:

A good WBS must be complete

A good WBS enables you to move directly into project planning. This is where you define the exact steps and timelines for all work. This is only possible if your WBS is complete — meaning you have included all deliverables and work packages. Using our ship building project as an example this would mean: Once all parts of the WBS have been implemented, you have a finished vessel ready for floating out.

A good WBS must be specific

To understand what I mean by *specific*, take this example: Every cruise ship has a number of restaurants. Two Italian restaurants, one Mexican, three US-style restaurants and two Asian ones. Being specific would mean you list all those restaurants by their name in the WBS:

How to make sure your WBS is 100% complete

What you absolutely want to avoid is missing to include any important elements. This would result in extra cost and effort — and possibly in a project delay. There are two ways how you can limit that risk:

- **Learn from similar projects:** Review similar projects and take a look at their WBS or project plan. You can easily find this information on Google. The insights you gain from this analysis are really valuable.
- **Involve your team:** The people who are going to do the work usually know best what things have to be taken care of. Have your team give you feedback on your WBS.

What tool should you use for creating a WBS?

Creating a WBS yourself can be challenging if your project is complex and has lots of deliverables. Pick a tool which can handle hierarchical diagrams well, otherwise you'll be pulling out your hair soon. For this article I have evaluated the following tools:

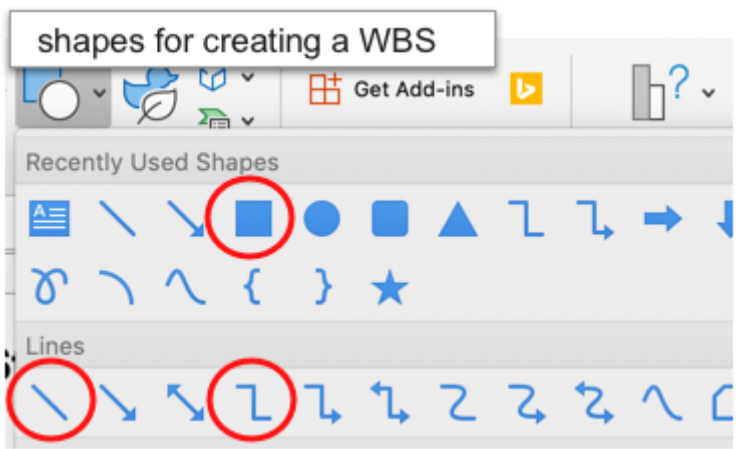
- MS Visio
- MS Project
- XMind
- Excel and Powerpoint

All five candidates cost money but Excel and Powerpoint are probably already installed on your PC. **MS Visio:** If you have the budget, I suggest getting Microsoft Visio. It's the best solution for creating work breakdown structures (and professionally looking charts in general). It also comes with ready to use WBS templates, so you can get started quickly. You can get Visio for around $15 a month. **XMind:** My second favorite is XMind. It's actually a mind mapping tool, but you can also create top-down style WBSes easily. The current cost is around $5 per month. **MS Project:** MS Project has support for WBS built in. It's also a complex tool to use and the license is quite expensive. I would only recommend using MS Project if you are managing multi million dollar projects. **Excel:** If you don't want to pay for software, use MS Excel. Further down you'll find an brief tutorial for creating WBS in Excel. You'll also find a ready-to-use WBS template for Excel. **Powerpoint:** Can you use Powerpoint as well? Sure. The drawing process is the same as in Excel. I just prefer Excel because I'm so used to it, but you can use either tool. Just make sure you chose a

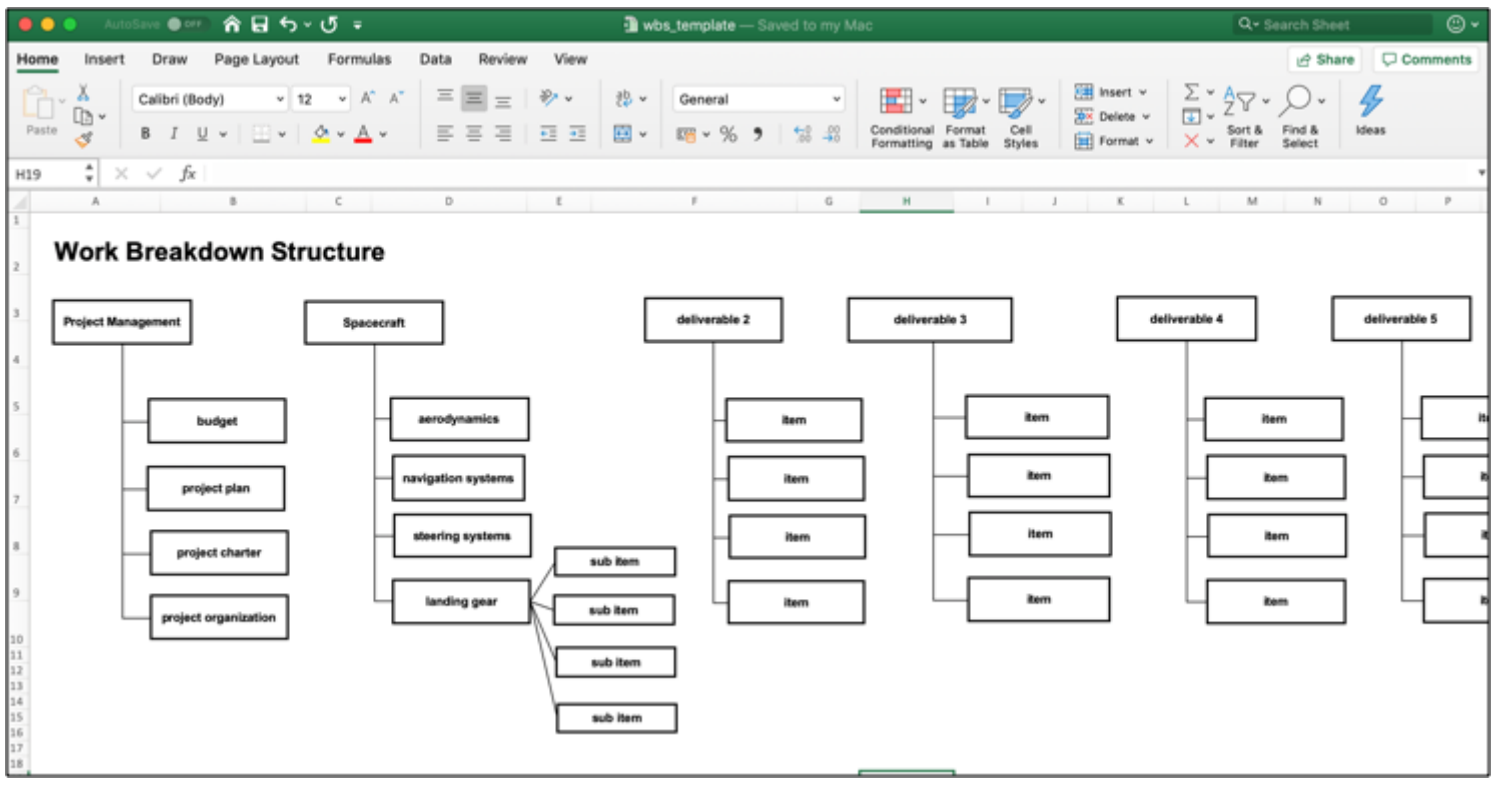
large page size to fit the entire WBS on the sheet.

Creating a work breakdown structure in Excel

Creating a WBS in Excel is pretty straightforward. You draw a bunch of rectangles and connect them using connector lines. Here are the shapes you have to use:



By using connector lines, you can move the boxes around and the connections will remain intact. Here's how a WBS in Excel looks like:



Work Breakdown Structure (WBS) template for Excel

The downside of using Excel is that it takes more time to draw the WBS. Why? Excel won't automatically re-arrange your structure when inserting new elements. Therefore you constantly have to rearrange existing nodes to avoid any overlaps. Also, the chart doesn't look as clean as in Visio because Excel doesn't automatically enforce identical node sizes.

Your WBS is ready. What comes next?

You use it to plan your project. This includes defining the action steps, estimating effort and putting together a team that will do the work for you. I also suggest making a printout of the WBS (using large paper) and pin it to your wall. This way you easily refer back to it when you need to check

something.

What else do you want to know?

I wanted to make the concept of work breakdown structures as clear as possible. Do you now feel you have a good understanding of it? Then I'd love to hear your feedback in a comment below. You can also ask me any further questions you may have.