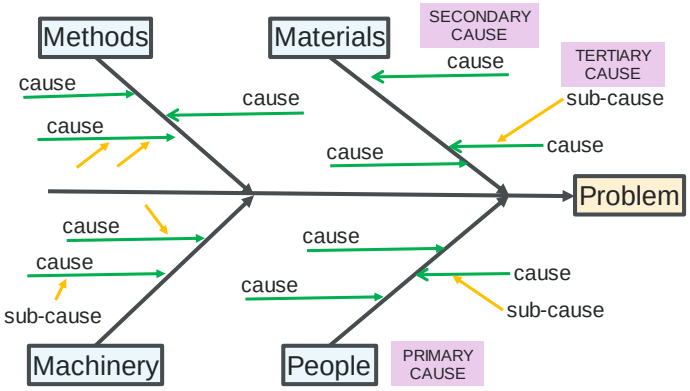
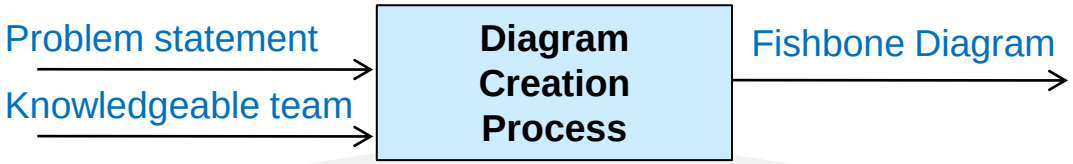
Fishbone Diagram / Ishikawa Diagram / Cause-and-effect Diagram

Problem
How to identify root causes?

Difficulty
Easy to use

- A **fishbone diagram** is a visual tool for identifying and displaying potential causes of a problem.
- A fishbone diagram determines increasingly detailed causes until a root cause is identified.
- Using the given initial structure, ask "Why?" to go from primary causes to sub-causes to sub-sub-causes (similar to the "5 Whys" technique)





1. Identify the problem to be analyzed. Write this as the mouth of the "fish" (typically on the right).
2. Select 4-8 primary causes – see below – to analyze the problem; these are the major bones of the fish.
3. For each primary cause identify as many secondary causes as possible and add them to the fishbone.
4. For each secondary cause identify as many tertiary causes as possible and add them to the fishbone.
5. Analyze the diagram to identify the causes that require deeper investigation.

Common Primary Causes

- **3M's & P** Methods, Materials, Machinery, and People
- **4P's** Policies, Procedures, People and Plant
- **6M's** Machine, Methodology, Materials, Measurement, Man, and Nature
- **8P's** Price, Promotion, People, Processes, Place / Plant, Policies, Procedures & Product (or Service) (*for administration*)
- **4S's** Surroundings, Suppliers, Systems, Skills (*for services*)

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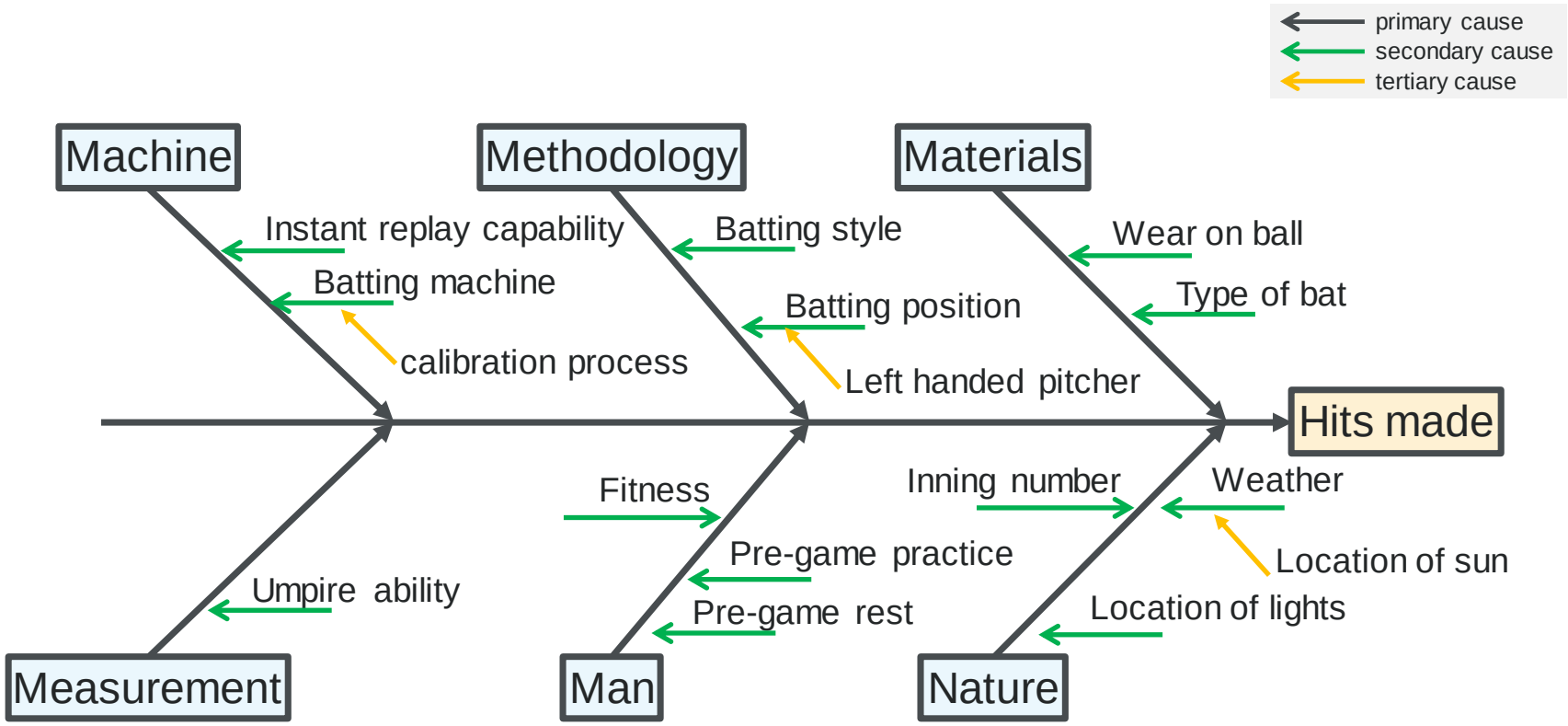
Fishbone Diagram – Example – Baseball team hits



1. For the primary causes, this fishbone started with the 6M's {Machine, Methodology, Materials, Measurement, Man, Mother Nature}. Other possibilities could have been used.
2. By brainstorming on each primary (and then secondary) cause, you can sometimes identify non-obvious potential causes. For example, under "Nature / Weather" the location of the sun may be an issue in non-US baseball parks.

Fishbone Diagram – Notes

Slide 1

1. A Fishbone Diagram is also caused a *Cause-and-effect Diagram* and a *Ishikawa Diagram*.
2. Fishbone Diagrams were invented by Kaoru Ishikawa. The name was changed from “Ishikawa “ to “fishbone” since it looks like a fish skeleton on its side.
3. This method is more structured than other brainstorming tools.
4. A fishbone diagram is one of the most popular Six Sigma tools.
5. Since fishbone diagrams only identify potential causes, a Pareto Chart might be used to determine which potential causes are, in fact, important causes to address.
6. The “5 Whys” tool and fishbone diagrams are similar tools. While a fishbone diagram performs a breadth-first search, a “5 Whys” analysis performs a depth-first search.
7. As in the “5 Whys” root cause analysis method, it is important that the potential root causes be actionable.
8. A fishbone diagram is one of the “7 Basic Quality Tools”: Check sheet, Control chart, Divide and Conquer, Fishbone diagram, Histogram, Pareto chart, Scatter diagram.

Slide 2

1. Using sticky notes for creating fishbone diagrams is recommended, as they can be moved around by the team developing the diagram.