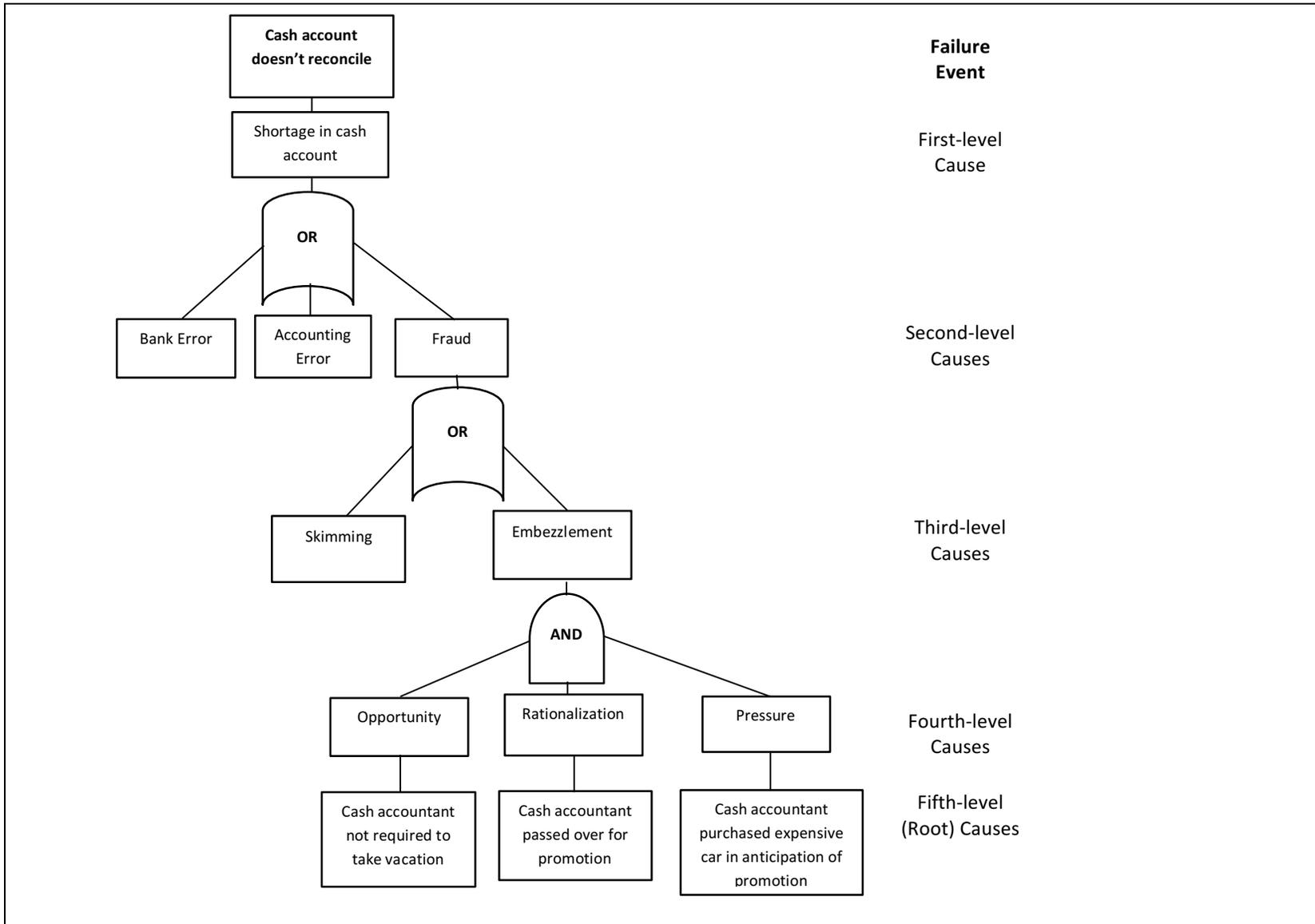


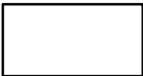
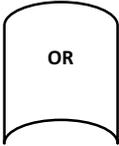
# Fault Tree Analysis



Fault Tree Analysis (FTA), a variant of the Five Whys technique, better accommodates multiple root causes by creating a “why tree.” The methodology enables users to identify and logically organize various conditions and factors (i.e., events and causes) contributing to a problem or issue and represent them pictorially. Whereas Five Whys looks for a single “why” at each iteration, FTA considers that each event can be produced by multiple factors and/or multiple combinations of causes, resulting in a more thorough exploration to the root of the problem. It helps analyze a problem by identifying all potential problem component areas, before determining potential actions to reduce risk.

The methodology also helps prevent incorrect analysis. If “why” questions can be answered with multiple conditions, the audit team could potentially arrive at the wrong conclusion — that is, if they go down the wrong failure path and fix problems that did not cause the issue or miss the causal factors that led to it. FTA considers both the why and the how by asking “What could cause that?” for each level to find the real root cause path. Similar to the Five Whys, analysis along five levels is a general rule of thumb, though the number of “whys” required to find the root of the problem can vary.

*Key FTA symbols:*

	Event	Describes the issue, cause, alternative, or reason why
	OR gate	The output event occurs <i>if at least one</i> of the input events occurs (events are independent)
	AND gate	The output event occurs <i>only when all</i> of the input events occur (events are dependent)

*OR Gate*

If any contributing cause could produce the event alone, then the “OR gate” is used. Before proceeding to the next layer of causes, the audit team should ensure it has collected the appropriate evidence/support to show the path(s) to which the root cause(s) belong. This step improves the odds of pursuing the right path and avoids wasted time and effort creating unnecessary branches.

### *AND Gate*

Alternatively, for problem events that require multiple causes to happen together, an “AND gate” is used. Audit teams may be tempted to stop at just eliminating one of the causes because technically only one of them needs to be removed to stop the effect. However, the team should still explore each branch in AND gate scenarios to find the most effective, least cost sub-cause and effect leg that prevents problem recurrence.

### *Steps for performing the FTA process:*

1. Begin constructing the fault tree by stating the problem/issue/undesired event, placing it in the first box, and labeling it the Failure Event.
2. Brainstorm the immediate causes of the problem/issue/undesired event and determine whether an OR gate or AND gate should be applied.
3. Gather evidence to confirm the paths to follow for OR gates and continue to build out the tree, along with AND gate paths.
4. Continue the process down through each level until all relevant causes are identified and root cause(s) are reached.
5. Evaluate the fault tree and develop action plans corresponding to the root cause(s) determined.