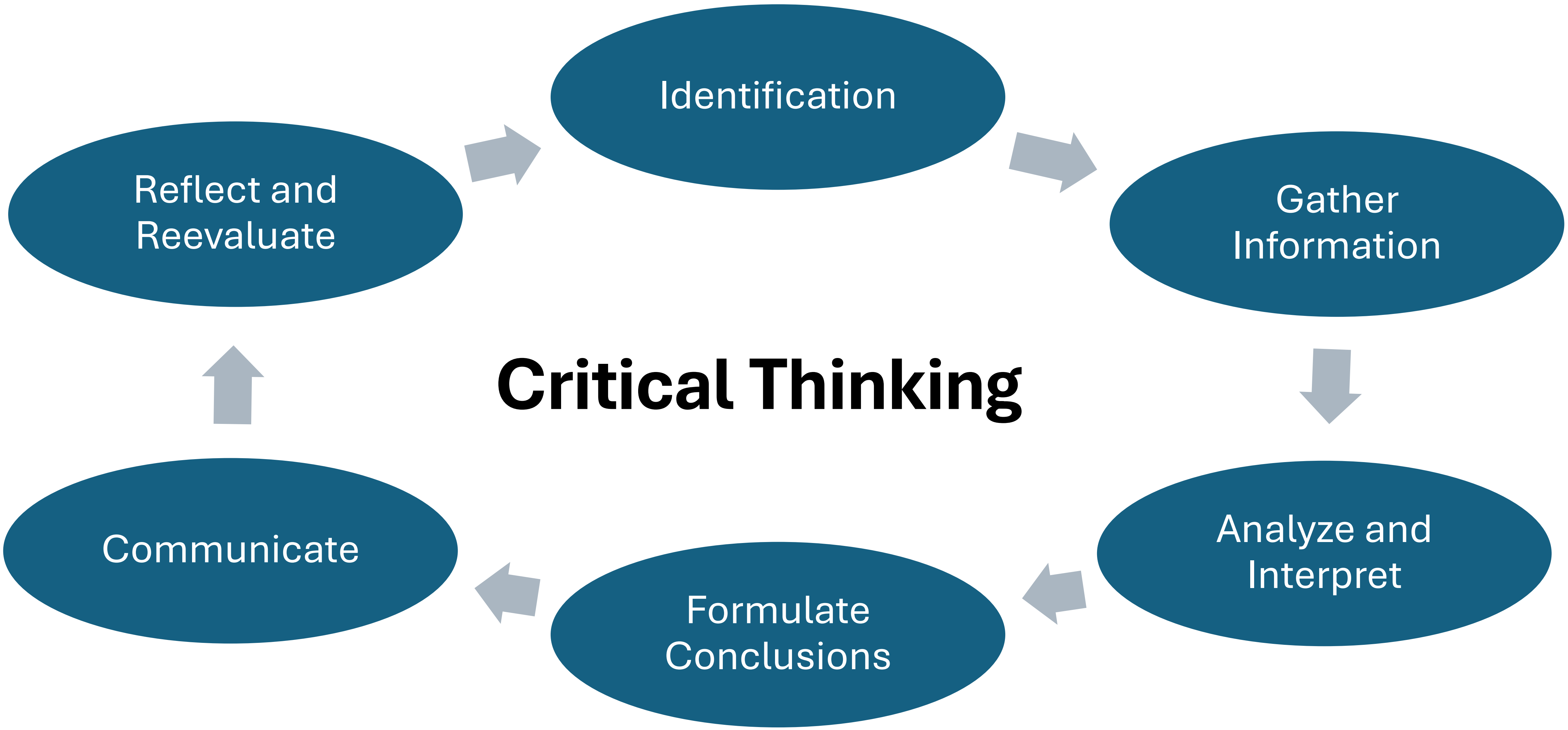
Elements of Critical Thinking

Critical Thinking

- Critical thinking is the ability to analyze, evaluate, interpret, and synthesize information to make reasoned judgments and decisions.
- Helps in making informed and rational decisions, especially in assessing risks.
- Data-driven, solution-focused


Identification
Gather Information
Analyze and Interpret
Formulate Conclusions
Communicate
Reflect and Reevaluate
Critical Thinking

Identification

Define what you are trying to solve or understand

- Clarifying the question
- Defining key terminology
- Understand the significance – why does this matter

Risk V Hazard

- A **hazard** is a biological, chemical, or physical agent that could cause harm
- **Risk** is the likelihood of a hazard causing harm.

Impact

Likelihood

	Negligible	Minor	Moderate	Significant	Severe
Very Likely	Low Med	Medium	Med Hi	High	High
Likely	Low	Low Med	Medium	Med Hi	High
Possible	Low	Low Med	Medium	Med Hi	Med Hi
Unlikely	Low	Low Med	Low Med	Medium	Med Hi
Very Unlikely	Low	Low	Low Med	Medium	Medium

Gather Information

Collect the relevant data, research, and evidence needed to make an informed judgment

What data do you need to identify risks?

- Reliable sources of data
- First-hand accounts

Analyze and Interpret

Examine the collected information critically and extract relevant insights

- Characterize risk
- Evaluate likelihood
- Look for patterns
- Understand cause and effect relationships
- Identify root cause
- Identify gaps in information
- Test/challenge assumptions

Formulate Conclusions

Come to a well-supported conclusion or propose a solution based on the analysis

- Summarize findings
- Prioritize risk
- Choose mitigation strategies
- Address uncertainties
- Create an action plan

Communicate and Justify the Conclusion:

Present the results of your critical thinking process clearly and convincingly.

- Clear Communication
- Support with Evidence
- Be Transparent
- Respond to Concerns
- Seek Feedback

Reflect and Reevaluate

Ensure the quality of your reasoning and conclusions and adjust as necessary.

- Monitor the Risk Landscape
- Adjust Risk Strategies
- Incorporate Feedback
- Iterate the Process

Example 1: Well Water

A farm primarily relies on well water for irrigation and produce washing. During an annual inspection, a worker notices that the well cap is loose, and small debris has accumulated around the wellhead. A recent water test also detected *E. coli* at a level requiring further assessment. The farm manager must determine whether the well water poses a food safety risk and what corrective actions are necessary.

1. **Identify the problem**
    - What potential risks does a loose well cap and debris around the well pose?
    - Could the detected *E. coli* be coming from surface contamination entering the well?
    - Does this issue require immediate corrective action, or is further investigation needed?
2. **Gather information**
    - Is the well properly sealed and designed to prevent surface water intrusion?
    - Have previous water tests shown any similar contamination trends?
    - Has the well been properly maintained (e.g., regular inspections, sanitization history)?
    - Have there been recent heavy rains or flooding that could have carried contaminants into the well?

3. Analyze and Interpret the Data

- Does the water supply the entire farm, or is it used only for certain operations (e.g., overhead irrigation, post-harvest washing)?
- Is this an isolated test result, or have previous tests shown similar issues?
- Would additional tests provide a clearer picture of contamination sources?

4. Formulate Conclusions

- Immediate Corrective Actions
    - Secure and properly seal the well cap to prevent further contamination.
    - Remove debris
    - Consider a chlorine shock treatment
- Retesting and Monitoring

5. **Communication**
    - Train employees on recognizing well integrity issues and proper water sampling methods.
    - Keep records of test results, well maintenance, and corrective actions
6. **Reflect and Reevaluate**
    - Monitor well water quality over time to ensure contamination does not reoccur.
    - Conduct regular well inspections and maintenance

Example 2: Foliar Application

A farm is harvesting apples during hot weather and plans to use overhead cooling within 24 hours of harvest to maintain quality. However, the farm has not conducted a recent microbial test on the water source, which is untreated surface water.

1. **Identify the problem**
   - Is it safe to apply untreated water directly onto apples so close to harvest?
   - Could this practice introduce microbial contamination that poses a food safety risk?
2. **Gather information**
   - Have past tests shown consistent water quality
   - What data exists on the die-off of bacteria on in field apples
   - What are the environmental conditions between now and harvest

3. Analyze and Interpret the Data

- Is the research from a credible source?
- If bacteria are present in the water, is the expected die-off sufficient to bring contamination levels below risk thresholds before apples are packed?
- Will environmental factors support or hinder the expected die-off rate?

4. Formulate Conclusions

- Proceeding with Overhead Cooling (if risk is deemed low)
- Implementing Risk Reduction Strategies
  - Use an alternative water source
  - Adjust timing so cooling occurs earlier

5. Communication

- Maintain records of risk assessments, supporting scientific data, and mitigation steps.
- If die-off data supports the decision, train workers on optimal cooling conditions

6. Reflect and Reevaluate

- Continue monitoring research
- Adjust farm water testing frequency to provide better real-time risk assessment.