**DENNIS OSADEBAY UNIVERSITY, ASABA DELTA STATE.**

**FACULTY OF COMPUTING**

**DEPARTMENT OF CYBER SECURITY**

**DOU-CYB122/DOU-IFT122**

**INTRODUCTION TO CRITICAL THINKING**

**Topic: Introduction to Critical Thinking**

**Learning Objectives**:

At the end of the class the students should be able to:

1. Describe the term *thinking* and discuss the subject critical thinking.
2. State the various characteristics (features) of critical thinkers
3. Analyze the critical thinking standards
4. Enumerate importance of critical thinking.
5. State the steps or processes in critical thinking.

**Overview of Critical thinking**

Thinking is a natural process and we cannot avoid it but we can definitely change our way of thinking. It is our brain which processes our thoughts when we look at any situation, object, data, person etc. Thinking involves **the entire process of learning, remembering, and organizing mentally to understand** the information better and recall it later. Thinking about issues involves all sorts of skills – and most of us could improve on them. Thinking can also be said to be an opinion or judgment. We have a set of preinstalled assumptions, reasons, logics and biases which construct our thoughts and we can definitely change or control them to build an effective thinking skill which is called critical thinking.

**Critical thinking**

The most exemplary philosopher for critical thinking was Socrates. Others includes Rene Descrates, John Dewey, Watson Glaser, Robert Ennis, etc.

Critical Thinking is the ability to think clearly and rationally, understanding the logical connection in a situation by analyzing the information, evaluating arguments to make informed decisions and arrive at considered judgment. It entails requiring evidence and considering an issue from multiple perspectives.

In this sense critical thinking means thinking clearly and intelligently with a pattern that requires people to be reflective, and pay attention to decision making which guides their beliefs and actions. More precisely, **critical thinking** is a metacognitive skill. What this means is that it is a higher-order cognitive skill that involves thinking about thinking and intellectual dispositions needed to effectively identify, analyze, and evaluate arguments and truth claims; to discover and avoid personal preconceptions and biases; to formulate and present convincing reasons in support of conclusions. Simply put, **critical thinking** is a metacognitive skill also known as higher-order cognitive skill that involves thinking about thinking observes an issue, then analyzes and evaluates it in order to form an objective judgment.

**Critical thinking skills**

Critical thinking skills are sometimes referred to as ‘higher order skills’ to differentiate them from ‘simpler’ (i.e., lower order) skills, such as rote memorization or routinization. Critical thinking skills allows individuals to understand and address situations based on all available facts and information. A critical thinker must use certain skills to accomplish critical thinking, such as observing an issue from multiple angles, analyzing data to find connections, developing a solution based on evidence, implementing the plan, and evaluating the outcome. Some critical thinking skills are:

1. **Observation**:

Observational skills are the starting point for critical thinking, as they are individuals who capable of understanding why something might be a problem. People who are observant can quickly sense and identify a new problem. They may even be able to predict when a problem might occur before it happens based on their experiences.

1. **Open-mindedness**: Embracing diverse perspectives, considering alternative viewpoints, and adjusting beliefs in response to new information. Being open-minded when having a conversation or participating in a group activity is crucial to success.
2. **Emotional ability**: Emotional ability includes curiosity, skepticism, and humility.

* **Curiosity** is the desire to acquire new information and explore alternative views.
* **Skepticism** is the willingness to question views and require evidence rather than blindly believing them, and
* **Humility** is the willingness to admit that one may be mistaken or acknowledging limitation in one’s knowledge and understanding. Therefore, being open to learning from others and revising one's beliefs in light of new evidence.

1. **Analytical Skills:** Once a problem has been identified, analytical skills become essential**.** Breaking down complex issues into manageable parts to better understand its structure, relationship and underlying assumptions, arguments and evidence. This also often includes gathering unbiased research, asking relevant questions about the data to ensure its accurate and assessing the findings objectively.
2. **Problem-solving**

After you’ve identified and analyzed a problem and chosen a solution, the final step is to execute your solution. Problem-solving often requires critical thinking to implement the best solution and understand whether or not the solution is working as it relates to the goal.

1. **Inference**: Inference is a skill that involves drawing conclusions about the given information and may require you to possess technical or industry-specific knowledge or experience. When you make an inference, which means you are developing answers based on limited information.
2. **Communication**

Communication skills are important when it comes to explaining and discussing issues and their possible solutions with colleagues and other stakeholders. Communication skills are abilities used when giving and receiving different kinds of information. They involve listening, speaking, observing and empathizing information in a clear, effective and efficient way.

**Process of Critical thinking**

There are essential **critical thinking steps** anyone can follow that will improve their critical thinking. They include:

**Step 1**: Identify the Problem or Question

The first step in critical thinking is to identify the problem or question that needs to be addressed. This may involve breaking down a complex issue into smaller parts or simply clarifying a question. It is important to define the problem or question clearly so that you can focus your thinking and research.

**Step 2**: Gather Information and Evidence

Once you have identified the problem or question, the next step is to gather information and evidence. This may involve researching online, talking to experts, or reading articles and books. It is important to evaluate the quality of the sources you use, considering their credibility and reliability.

**Step 3**: Evaluate the Information and Evidence

Once you have gathered information and evidence, the next step is to evaluate it. This involves assessing the relevance, credibility, and accuracy of the sources you have used. You should consider the biases of the authors or sources and look for evidence that supports different viewpoints.

**Step 4**: Consider Different Perspectives

After you have evaluated the information and evidence, the next step is to consider different perspectives. This involves examining the arguments and reasoning of those who disagree with you and considering how your own biases and assumptions might be affecting your thinking. It is important to approach different viewpoints with an open mind and a willingness to consider evidence that contradicts your own beliefs.

**Step 5**: Draw a Conclusion

The final step in critical thinking is to draw a conclusion. This involves synthesizing the information and evidence you have gathered and evaluating it in light of the different perspectives you have considered. Your conclusion should be based on logic and evidence, rather than emotions or personal biases. It is important to be willing to revise your conclusion if new information comes to light.

**Critical Thinking Standards**

These are conditions that critical thinking should meet to be considered as normal and acceptable. Critical thinking is disciplined thinking governed by clear intellectual standards. Among the most important of these intellectual standards are **clarity, accuracy, relevance, consistency, logical correctness, breadth, fairness**, and **depth**.

Critical Thinking Standards

1. **CLARITY**

Before we can effectively evaluate a person’s argument or claim, we need to understand clearly what he or she is saying to avoid confusion or ambiguity. Unfortunately, that can be difficult because people often fail to express themselves clearly. Some factors that led to this lack of clarity is: laziness, carelessness, or a lack of skill. At other times it results from a misguided effort to appear clever, learned, or profound.

Understanding a problem can be achieved only if we value and pursue clarity of thought to the extent that he or she can elaborate, illustrate, and exemplify it.

1. **Accuracy**

Free from errors, mistakes or distortions; which is said to be true, and correct. A statement can be clear but nor accurate. As a critical thinker your thought and actions must be accurate and timely.

Questions that focus on accuracy in thinking include:

* How could I check that to see if it is true?
* How could I verify these alleged facts?
* Can I trust the accuracy of these data given the source from which they come?

1. **Relevance**

When reasoning through an issue, one should concentrate on the most important information (relevant to the issue) and take into account the most important ideas or concepts. Anyone who has ever sat through a boring school assembly or watched a mud-slinging political debate can appreciate the importance of staying focused on relevant ideas and information. A favorite debaters’ trick is to try to distract an audience’s attention by raising an irrelevant issue. Questions that focus on relevance include:

* What is the most relevant information needed to address this issue?
* How is that fact important in context?
* Could you explain the connection between your question and the question we are addressing?
* How does this idea relate to this other idea or to the issue at hand?

1. **Consistency**

There are two kinds of inconsistency that we should avoid. One is *logical inconsistency,* which involves saying or believing inconsistent things (i.e., things that cannot both or all be true) about a particular matter. The other is *practical inconsistency,* which involves saying one thing and doing another.

1. **Logical Correctness**

To think logically is to reason correctly—that is, to draw well-founded conclusions from the beliefs we hold and the parts make sense together, no contradictions; in keeping with the principles of sound judgment and reasonability. That is when the combination of thoughts is mutually supporting and makes sense in combination, the thinking is logical. Questions that focus on logic include:

• Does all this fit together logically?

• Does this really make sense?

1. **Depth**

Depth implies thoroughness in thinking through the many variables in the situation, context, idea, or question. A statement can be clear, accurate, precise, and relevant, but superficial (i.e., lack depth). In most contexts, we rightly prefer deep and complete thinking to shallow and superficial thinking. However, thinking is better when it is deep rather than shallow, thorough rather than superficial. Depth in thinking give detailed reasons on the situation.

1. **Fairness**

Finally, critical thinking demands that our thinking be fair—that is, open-minded, impartial, and free of distorting biases and preconceptions. Fairness implies the treating of all relevant viewpoints alike without reference to one’s own feelings or interests. That can be very difficult to achieve. It is probably unrealistic to suppose that our thinking could ever be completely free of biases and preconceptions; to some extent we all perceive reality in ways that are powerfully shaped by our individual life experiences and cultural backgrounds. But as difficult as it may be to achieve, basic fair-mindedness is clearly an essential attribute of a critical thinker.

1. Breadth:

Encompassing multiple viewpoints, comprehensive in view, wide ranging and broadminded in perspective. A line of reasoning may be clear, accurate, precise, relevant, and deep but lack breadth (as in an argument from either the conservative or liberal standpoints which details the complexities in an issue, but only recognizes insights from one perspective).

Thinking can be more or less broad-minded (or narrow-minded), and breadth of thinking requires the thinker to reason insightfully within more than one point of view or frame of reference. Questions that focus on breadth in thinking include:

• What points of view are relevant to this issue?

• What relevant points of view have I ignored thus far?

**Importance of Critical thinking**

1. Critical thinking is essential for effective problem-solving and decision-making in all areas of life which is used to enhance work processes and improve social institutions.
2. Critical thinking enhances creativity, communication skills, and academic performance.
3. Critical thinking is crucial for self-reflection and a tool for self-evaluation which fosters independence of thought and skepticism towards unverified claims.
4. Helps in understanding and interpreting complex issues.
5. Critical thinking helps us acquire knowledge, improve our theories, and strengthen arguments.

**PERCEPTION AND REALITY**

**Introduction**

Perception and reality are two related but distinct concepts. Perception refers to the way we interpret and understand the world around us, while reality refers to the actual state of affairs. In this lecture, we will explore the concept of perception and reality, and how they relate to critical thinking. Perception is the process by which we interpret and organize sensory information from the world around us.

**Difference between Perception and Reality**: Perception and reality are not always the same. Our perception of reality can be influenced by various factors, including biases, assumptions, and expectations.

1. Biases: Preconceived notions or attitudes that can affect our perception. For example, if we have a bias against a particular group of people, we may perceive them in a negative light.
2. Assumptions: Assumptions can lead to inaccurate perceptions if they are not based on evidence. For example, assuming that someone is dishonest based on their appearance or background.
3. Expectations: Expectations can influence what we perceive and how we interpret it. For example, if we expect a certain outcome, we may perceive the information in a way that supports our expectation.

**Strategies for Improving Perception**

1. Awareness of Biases: Recognizing our own biases and assumptions can help us to improve our perception. By being aware of our biases, we can take steps to mitigate their influence.
2. Open-Mindedness: Being open-minded and receptive to new information can help us to improve our perception. By considering multiple perspectives and being open to new ideas, we can gain a more nuanced understanding of the world.
3. Critical Thinking: Applying critical thinking skills can help us to evaluate information more effectively and improve our perception. By analyzing information, evaluating evidence, and drawing conclusions based on reasoning, we can make more informed decisions.

At this point I will ask what is objectivity?

Objectivity refers to the ability to consider or represent facts and information without being influenced by personal feelings, interpretations, or prejudice. It involves evaluating information based on evidence and reasoning, rather than on personal opinions or biases.

Key characteristics of objectivity:

1. Impartiality: Objectivity involves being impartial and unbiased in one's evaluation of information.

2. Evidence-based: Objectivity relies on evidence and data to support conclusions, rather than on personal opinions or assumptions.

3. Neutral perspective: Objectivity involves considering multiple perspectives and evaluating information without taking a partisan or biased stance.

4. Focus on facts: Objectivity focuses on verifiable facts and data, rather than on personal interpretations or opinions.

Benefits of objectivity:

1. More accurate decision-making: Objectivity can lead to more accurate decision-making by reducing the influence of personal biases and assumptions.

2. Increased credibility: Objectivity can increase credibility and trust in one's work or opinions, as it is based on evidence and reasoning rather than personal opinions.

3. Better problem-solving: Objectivity can lead to more effective problem-solving by considering multiple perspectives and evaluating evidence.

Challenges to objectivity:

1. Personal biases: Personal biases and assumptions can influence one's evaluation of information and lead to subjective conclusions.

2. Emotional involvement: Emotional involvement in a issue can lead to biased decision-making and a lack of objectivity.

3. Cultural and social influences: Cultural and social influences can shape one's perceptions and lead to biased conclusions.

By striving for objectivity, individuals can make more informed decisions, evaluate information more effectively, and develop an understanding of the world around them.

Importance of Objectivity: Striving for objectivity can help us to gain a more accurate understanding of reality. By setting aside our biases and assumptions, we can evaluate information more effectively and make more informed decisions.

In conclusion, perception and reality are two related but distinct concepts. By understanding the factors that influence perception and applying strategies for improving perception, individuals can develop a more accurate and nuanced understanding of the world around them. Critical thinking plays a crucial role in improving perception and gaining a more accurate understanding of reality. Examples

1. A person may perceive a new policy as unfair because of their personal experience with a similar policy in the past. However, upon further examination, they may realize that the new policy is actually designed to address a different issue.
2. A company may perceive a competitor's product as inferior based on their own biases and assumptions. However, upon closer examination, they may realize that the competitor's product is actually superior in some ways.

By recognizing the factors that influence perception and applying strategies for improving perception, individuals can develop a more accurate and nuanced understanding of the world around them. Critical thinking is essential for evaluating information, identifying biases and assumptions, and making informed decisions.

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**CYB 122: INTRODUCTION TO CRITICAL THINKING**

**Topic: Psychological Barrier to logical and critical thinking**

**Learning Objectives**:

At the end of the class the students should be able to:

1. Enumerate various barriers of critical thinking.
2. Describe the importance of knowing the barrier to critical thinking
3. State how to improve our minds to be a critical thinker.

**Barrier to critical thinking**

**Critical thinking**, or higher-order thinking, observes an issue, then analyzes and evaluates it in order to form an objective judgment.

Barriers to critical thinking can be as simple as using emotions rather than logic to make a decision to the complex individual biases that subconsciously dictate decisions. The ability to detect these barriers can help prevent costly which is beneficial to our knowledge of critical thinking. Also with a bit of training, anyone can avoid these barriers and become a critical thinker.

[](https://globisinsights.com/career-skills/critical-thinking/books-on-critical-thinking-and-problem-solving/)

Some common barriers that get in the way of thinking critically.

1. **Egocentrism (Self- centered thinking)**

Egocentrism is the tendency to think and see the world or reality only as it relates to oneself alone. Egocentrics are selfish, self-centered people who view their interests, ideas, and values as superior to everyone else’s, but there’s great value in training our minds to be able to view issues from another’s point of view.

1. **Sociocentrism**

Sociocentrismalso known as group-centered thinking. The group-centered thinking effect is a phenomenon where individuals conform to the beliefs of others in order to avoid appearing different and suppress independent thoughts and actions. Sociocentrism hinder rational thinking by focusing excessively on the group. Sociocentrism can distort critical thinking in many ways such as:

1. Conformism: refers to our tendency to follow the crowd. This occurs when a person makes a decision, not with critical thinking but based on the opinions made by others around them
2. Group bias: is the tendency to see one’s own group (nation, tribe, sect, peer group, and the like) as being inherently better than others. Clearly, this kind of “mine-is-better” thinking lies at the root of a great deal of human conflict, intolerance, and oppression.

This is an especially tough barrier for teenagers and young adults who are often desperate to be accepted and liked by their peers. They absorb group bias unconsciously rather than relying on critical thinking to decipher between right and wrong, they may cave to peer pressure because “everyone else is doing it.” (eg yahoo yahoo)

To overcome groupthinking and cultural conditioning, it requires the courage to break free from the crowd through questioning popular thoughts, culturally embedded values, and belief systems in a detached and objective manner.

1. **FEAR**

Fear is a weighty one of all the psychological obstacles to critical thinking. It could either be the fear of failure or the fear of change as it is most likely to act as a hindrance to critical thinking. Sometimes, when we look at an issue from every angle, we find that the only right reaction is to change.

Likewise, if we fear failure, we’re likely to not act or try at all. And when it comes to trying to discern the truth in order to act upon it, not doing so can be far worse than the perceived failure itself.

1. **Personal Biases and Preferences**

Everyone internalizes certain beliefs, opinions, and attitudes that manifest as personal biases. *You* may feel that you’re open minded, but these subconscious judgments are more common than most people realize. Personal biases and preference based on factors such as race, gender, religion, or socioeconomic status can influence our perceptions and judgments. They can distort your thinking patterns and sway your decision making in the following ways:

***Confirmation bias*:** favoring information that reinforces your existing viewpoints and beliefs.

***Anchoring bias*:** being overly influenced by the first piece of information you come across.

***False consensus effect*:** believing that most people share your perspective.

***Normalcy bias*:** is a subconscious response assuming that things will stay the same despite significant changes to the status quo. The critical thinking process requires being aware of personal biases that affect your ability to rationally analyze a situation and make sound decisions.

Every type of bias works against critical thinking as it uses emotions to make decisions rather than rational thought rooted in truth. These biases can lead to unfair assessments, stereotyping, and discrimination if not addressed through critical reflection and self-awareness.

1. **ASSUMPTIONS**

An **assumption** is something we take for granted, something we believe to be true without any proof or conclusive evidence. Assumptions dampen our ability to learn. Though often flawed, assumptions quench our desire to ask questions because we think we already know the answers. Assumptions could be warranted or unwarranted. Unwarranted assumptions, however, are unreasonable. An *unwarranted* assumption is something taken for granted without good reason. Such assumptions often prevent our seeing things clearly.

For example – Some people assume that because they don’t understand something, then it must be impossible to learn. That’s simply not true. We have an innate ability to learn new things, and critical thinking helps us do just that—with integrity.

**Strategies for Enhancing Critical Thinking**

The bad news is that barriers to critical thinking can really sneak up on you and be difficult to overcome. But the good news is that anyone can learn to think critically with training and practice of the critical thinking standards as well as the steps/processes of critical thinking.

1. **Developing Analytical Skills**: Practice problem-solving, logical reasoning, and analytical thinking through exercises and puzzles.
2. **Seeking Diverse Perspectives**: Actively seek out viewpoints that challenge your own beliefs and assumptions.
3. **Engaging in Reflective Practice**: Regularly reflect on your thinking process, identifying biases and areas for improvement.
4. **Promoting Intellectual Curiosity**: Cultivate a curiosity-driven mindset, constantly seeking to learn and explore new ideas.
5. **Utilizing Critical Thinking Tools**: Use tools such as argument analysis, evidence evaluation, and logical reasoning to enhance critical thinking skills

**Arguments and Inference**

Arguments and inference are critical components of critical thinking. An argument is a claim or assertion that is supported by evidence and reasoning, while inference is the process of drawing conclusions based on evidence and reasoning.

An argument is a claim or assertion that is supported by evidence and reasoning. An Argument typically consists of several components, including:

- Premises: The evidence or reasons that support the claim.

- Conclusion: The claim or assertion being made.

Evaluating Arguments

- Evaluating Premises: Premises should be evaluated for their credibility and reliability.

- Evaluating Conclusions: Conclusions should be evaluated for their logical coherence and consistency with the premises.

**Inference-**Inference is the process of drawing conclusions based on evidence and reasoning.There are several types of inference, including:

- Deductive Inference: Deductive inference involves drawing conclusions that follow necessarily from the premises.

- Inductive Inference: Inductive inference involves drawing conclusions that are probable but not certain.

Arguments and inference are critical components of critical thinking. By understanding the components of an argument and evaluating arguments and inference, individuals can develop their critical thinking skills and make more informed decisions.

<https://study.com/academy/lesson/common-barriers-to-critical-thinking.html>

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**INTRODUCTION TO CRITICAL THINKING**

**Topic: Critical Thinking in Workplace**

**Learning Objectives**:

At the end of the class the students should be able to:

1. Describe critical thinking in a work place.
2. State ways to foster critical thinking in different organizations.
3. Enumerate important skills needed as a cyber security expert.
4. Describe decision making, therefore stating the styles of decision making

**Introduction**

Critical thinking is an essential skill that can be applied to various aspects of everyday life. In this lecture, we will explore how critical thinking can be applied to everyday situations, evaluate information and sources, and make informed decisions.

**Critical Thinking in Workplace**

Critical thinking is an important soft skill that is becoming increasingly important in today's fast-paced, ever-changing workplace. Increasingly, employers are looking not for employees with highly specialized career skills, since such skills can usually best be learned on the job.

Critical thinking in a workplace is the ability to analyze information, evaluate evidence, and make rational decisions without bias to solve a problem in a workplace. It involves using logic, reasoning, and creativity to identify problems, explore alternative solutions, and choose the most effective course of action which drives the success of their organization. Employees with critical thinking skills can make more informed and strategic decisions, solve complex problems, communicate effectively, increase overall productivity, and drive the success of their organizations. The aim of developing and cultivating critical thinking skills in a work environment, positions employees as valuable assets to their organizations and advance their careers in today's competitive job market.

These abilities enable employees to think outside the box by weighing the pros and cons, identify new opportunities, and develop creative solutions to workplace challenges so as to make informed decisions that benefit both the company and its customers.

Critical thinking skills are especially important in positions requiring decision-making, such as health, management, sales, marketing, finance, and customer services in all works of life for identifying customers and clients’ needs, developing effective strategies, and adapting to changing market conditions.

**Applying Critical Thinking to Everyday Situations**

- Evaluating Information: Critical thinking involves evaluating information and sources to determine their credibility and reliability.

- Analyzing Arguments: Critical thinking involves analyzing arguments and identifying strengths and weaknesses.

- Making Informed Decisions: Critical thinking enables individuals to make informed decisions based on evidence and reasoning.

**Importance of critical thinking in the workplace:**

1. **Problem-solving**: Critical thinking enables employees to identify and understand problems .i.e. determining the root cause or causes of the problem, deciding the best course of action in order to solve the problem by considering various perspectives, and develop innovative solutions to address challenges effectively.
2. **Decision-making**: By evaluating evidence, assessing risks, and weighing the pros and cons of different options, critical thinkers can make well-informed and thoughtful decisions that benefit the organization.
3. **Innovation and creativity**: Critical thinking encourages questioning assumptions, challenging the status quo, and exploring new ideas, promoting a culture of innovation and continuous improvement.
4. **Adaptability and resilience**: Critical thinkers can adapt to change and uncertainty, assess the implications of new information, and adjust strategies accordingly to maintain a competitive advantage.
5. **Communication**: Critical thinking skills help employees articulate their thoughts clearly, listen to others' perspectives, fostering effective communication and collaboration within teams.
6. **Leadership development**: As critical thinking involves reflection and independent judgment. Employees who can engage in critical thinking are reflective, independent and competent which them to become more self-aware, ethical, and confident leaders.

To foster critical thinking in the workplace, organizations can:

1. Encourage open and respectful communication among team members.
2. Provide opportunities for ongoing learning and development.
3. Model critical thinking behaviors in leadership and management roles.
4. Create a culture that values curiosity, creativity, and open-mindedness.

**Evaluating Information and Sources**

- Evaluating Sources: Critical thinking involves evaluating sources to determine their credibility and reliability.

- Identifying Biases: Critical thinking involves identifying biases and assumptions in information and sources.

- Considering Multiple Perspectives: Critical thinking involves considering multiple perspectives and evaluating evidence.

**Making Informed Decisions**

- Weighing Options: Critical thinking involves weighing options and considering the potential consequences of each option.

- Evaluating Evidence: Critical thinking involves evaluating evidence and making decisions based on evidence and reasoning.

- Avoiding Impulsive Decisions: Critical thinking involves avoiding impulsive decisions and taking the time to evaluate options and evidence.

**Critical thinking in Cyber security**

Critical thinking is paramount for cyber security experts as it enables professionals to assess risks, identify vulnerabilities, and devise effective and innovative strategies to address complex security challenges. You must have a range of skills, including technical, operational and managerial skills added to critical thinking skills. Here is a list of the basic skills you will need to enter the world of cyber defense.

* **Problem Solving**

Solving critical problems will be part of your daily work. You will need to be innovative in creating effective measures to address complex security challenges.

* **Technical and Security Aptitude**

As a cybersecurity professional, you need to be technologically savvy to keep up with current and emerging threats to mitigate security. You must keep in mind that the work of a cybersecurity expert is purely technology-focused as well as being familiar with various platforms is essential in computing.

* **Attention to Details**

To secure large organizations from cyber-attacks, a cyber security professional needs to be alert and attentive to details. As well as, monitor the network regularly and if a threat occurs, you have to identify it swiftly and come up with security solutions in real-time. Therefore, staying attentive is vital.

* **Communication Skills**

From Management to Chief Security Officer, vendors, and the general workforce, cyber security professionals must interact with every stakeholder. Having powerful communication skills is critical to effectively communicate security policies, procedures, guidelines and solutions to all which is vital for incident response, threat mitigation, and collaboration among teams

* **Forensics Skills**

Computer forensics is a branch of cyber security which uses technology and investigative techniques, to identify, collect, and store evidence from an electronic device. The management of digital evidence is critical for solving cyber-crimes and recovering important, compromised data.

**DECISION MAKING**

A decision is a conclusion of a thought out choice or selection made between two or more alternative courses of action in a situation of uncertainty.

Decision-making is the process of evaluating options based on individual values, preferences, and available information thereby selecting the best course of action. It is an essential aspect of both personal and professional life. Every decision making process produces a final choice with an output that may be an action or an opinion of choice. When making a decision, it's important to consider all of the relevant factors, including people, resources, time, costs, benefits, risks, opportunities, etc. The ability to make sound decisions is essential for success in both personal and professional life

**Steps of Decision Making Process**

Making decisions are based on careful analysis of numerous circumstances especially in a timely manner can be critical. Therefore, it shouldn’t be procrastinated or taken in haste. Making decisions can be hard, especially when the odds are not in your favor.

* **Problem Identification**:

A problem is defined as a discrepancy between an existing & a desired state of affairs. Defining and understanding the nature of the problem is the first step in the decision-making process. It involves having clarity of the problem or question. One of the ways to clarify the decision-making process is to formulate a series of questions that can be asked at different stages in the process, such as:

1. What exactly is the problem?
2. Why the problem should be solved?
3. Who are the affected parties of the problem?
4. Does the problem have a deadline or a specific time-line?

* **Information Gathering**: Is the process of solving the problem, you will have to gather as much relevant information related to the factors and stakeholders involved in the problem by searching for resources. This process of gathering information is important because it helps to avoid wasting time and money on things that are not needed. As well as, it provides a base for other decisions that are to follow.
* **Generating Alternatives**: This step involves brainstorming and developing a list of potential solutions or courses of action based on information gathered. This step encourages creativity and exploring a wide range of options can lead to better decision outcomes.
* **Evaluating Alternatives**: This step involves analyzing the options and assessing the pros and cons of each alternative .i.e. considering factors such as risks, costs, benefits, and alignment with individual or organizational goals and values.
* **Selection of an alternative**: Based on the evaluation of alternatives, you must choose the most suitable option, taking into account both rational factors (e.g., quantitative data) and subjective factors (e.g., intuition, personal values).
* **Implementing the Decision**: After selecting an alternative, it is crucial to develop a plan to implement the decision effectively, ensuring that necessary resources are available and potential obstacles are addressed.
* **Monitoring and Reviewing the Decision**: The last step in the decision making process. Once the decision has been implemented, decision-makers should monitor its outcomes and review the result of the decision to see whether the problem was resolved. Learning from past decisions can inform and improve future decision-making processes i.e If the evaluation shows that the problem still exists, then the manager needs to assess what went wrong either by redoing an earlier step or might even require starting the whole process over.

**Decision-Making Conditions**

In decision making, many aspects are at play when we need to choose between a set of criteria to decide an outcome. Decision-making conditions refer to the various factors or circumstances that influence how decisions are made. Decisions can be categorized under three (3) different conditions which represent different levels of information and predictability surrounding the outcomes of decisions

* **Certainty**: Under certainty, the outcome of a decision is known with absolute confidence, allowing decision-makers to make choices confidently based on this knowledge. It’s like having all the answers in a test! They gather all the info, weigh the pros and cons, and boom! Decision made.
* **Risk**: Risk refers to decision-making conditions where multiple alternatives exist, and decision-makers have some knowledge about the probabilities of different outcomes. In this situation the decision maker is able to estimate the likelihood of certain outcomes. Under risk, individuals make decisions based on data from past personal experiences or secondary information that lets them assign probabilities to different alternatives. It is a mix of skills and educated guesses.
* **Uncertainty**: A situation in which a decision maker lack sufficient information to accurately assess the probabilities of different outcomes. Due to limited information available, the decision maker may be forced to rely on intuition, experience and “gut feelings”. It’s a blend of creativity and intuition. Eg. Is like navigating through the fog – you can’t quite see what’s ahead.

**Decision-Making Styles**

Decision-making styles refer to the various approaches individuals or groups employ when making decisions. According to Alan J. Rowe and Richard O. Mason, they are 4 decision making styles in the context of management decision making.

* **Directive decision making:** Directive decision makers are both practical and logical. Their decisions are rooted in their own knowledge, experience, and rationale, rather than going to others for more information. This style is useful in situations where there is a need for quick action, clarity, and decisiveness, such as during emergencies or when dealing with inexperienced team members.
* **Analytical Decision-making**: this involves gathering and analyzing relevant information from their sources and consider factual and detailed information before taking or making any decision. Managers using analytic decision making style take more time as they would like to have more information by breaking down complex problems into smaller parts and consider more alternatives before coming to a conclusion.
* **Behavioral Decision-Making**: A behavioral style of decision-making is a “people-oriented” style which focuses on relationships more than the task. It evaluates the feelings of others as part of their decision-making process. Leaders who follow this model believe in participative management and consider the achievement of subordinates by taking suggestions from them. They try to get inputs from others through meetings and discussions. Behavioral decision-making style encourages a cooperative environment, promotes teamwork, and can lead to more creative solutions by incorporating diverse perspectives. Though it makes decision making slow and less efficient.
* **Conceptual Decision-making**: Conceptual decision making style are intuitive in their thinking and have high tolerance for ambiguity. Conceptual decision-makers encourage creative thinking and collaboration and consider a broad array of perspectives. Those who make decisions with a conceptual style are big picture thinkers who are willing to take risks.

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