DLE 2083: INTRODUCTION TO SECURITY MANAGEMENT

CHAPTER 6

PROBABILITY AND UNCERTAINTY

Chapter 6: Learning Outcomes

- At the end of the topic, students should be able to:
  - Defines uncertainty and probability.
  - Explain the difference between uncertainty and probability.
  - Understand types of security services in Malaysia.
  - Describes functions of public security.
  - Explain the roles of Auxiliary Police in Malaysia.

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Introduction

- The concepts of risk and hazard inherently include the concept of uncertainty.

- Risk is **potential** returns, and a hazard is a **potential** threat.

- This **potential** is a type of **uncertainty**.

Defining Uncertainty

- Uncertainty is a state of limited knowledge where the likelihood of events, impacts, or threats is not fully understood or quantifiable.

- Uncertainty exist due to "an absence of information, knowledge, or understanding regarding the outcome of an action, decision, or event".

- Refers to degree of ignorance and ambiguity

Examples of Uncertainty

- Not knowing whether a particular vulnerability exists in a system.

- Ambiguity about an attacker's intentions or capabilities.

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Defining Probability

- Probability, likelihood, and chance each mean the extent to which something could occur.

- Probability implies quantitative expressions (using numbers)

- Quantitatively, probability can be expressed as a number from 0 to 1 or a percentage from 0% to 100%.

- Relies on data and model

Examples of Probability

- **Assessing the likelihood of a ransomware attack affecting a system (e.g., "There is a 30% chance this year").**
- **Lets do an activity:**
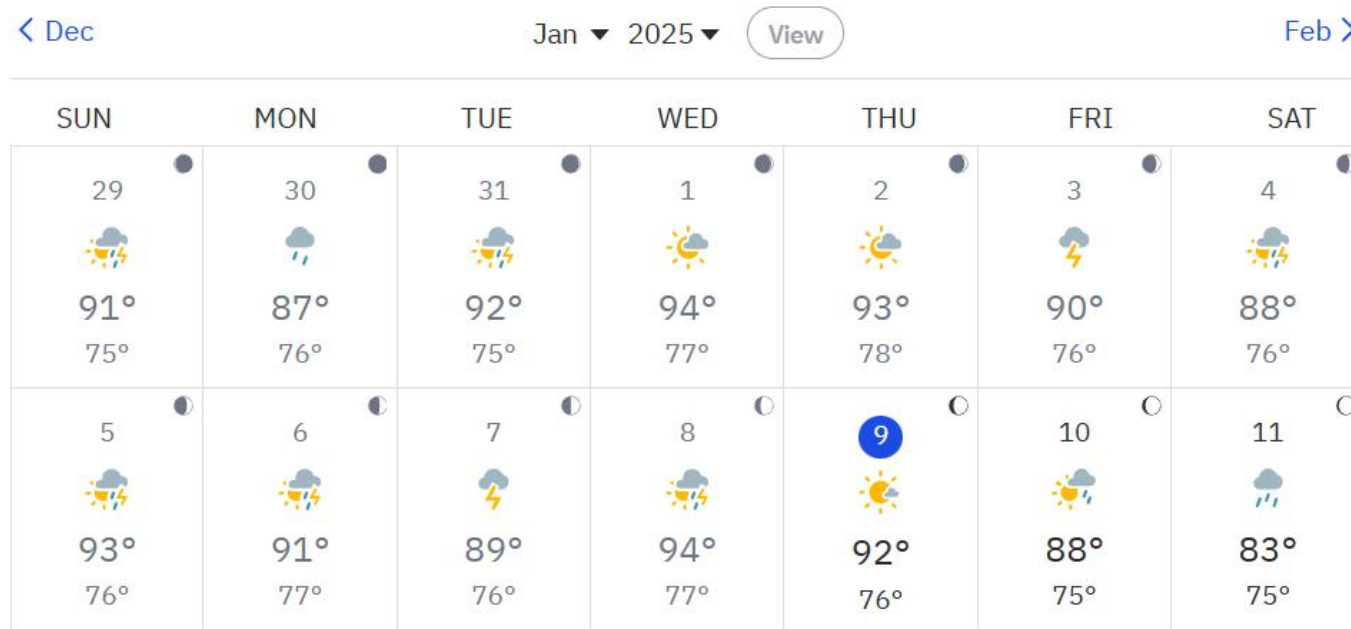
Examples of Probability

- **What is probability for**
- **Hot weather?**
- **Rainy weather?**
- **Cloudy weather?**
- **Precipitation-based weather?**
- **Extreme weather?**

12	13	14	15	16	17	18
85°	87°	90°	88°	87°	87°	87°
75°	75°	75°	75°	75°	75°	75°

19	20	21	22	23	24	25
					Avg	Avg
88°	90°	90°	90°	90°	89°	89°
74°	74°	74°	74°	74°	73°	73°

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The Relationship Between Uncertainty and Probability

- Uncertainty often affects probability calculations.

- For example: If there's high uncertainty about a system's vulnerabilities, estimating the probability of a successful attack becomes less reliable.

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The Relationship Between Uncertainty and Probability

- Uncertainty implies no assessed probability, so an uncertain event implies a range of probabilities from 0% to 100%.

- Certainty, like definitely, implies a probability of 100%.

Certainty   Risk   Uncertainty

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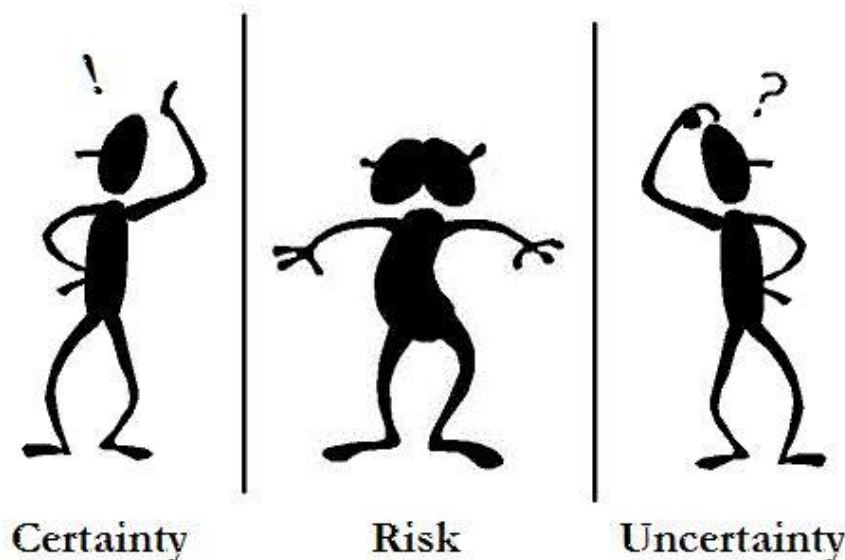
The Difference Between Uncertainty and Probability

Aspect	Uncertainty	Probability
Focus	Lack of knowledge or ambiguity	Likelihood of a specific event occurring
Nature	Subjective, qualitative, or semi-quantitative	Objective, quantitative
Measurement	Difficult to quantify; ranges or categories	Numerical (0–1 or percentage)
Role in Security	Highlights gaps in information or clarity	Guides risk assessment and prioritization
Dependency	May decrease as knowledge improves	Requires sufficient data to calculate