1. Heuristic Evaluation

- **Definition**: A usability inspection method where evaluators examine a user interface to ensure it conforms to established usability principles (heuristics).
- **When and Why It Is Used**: Used to evaluate interactive products at any stage of the design process, especially when user testing is impractical. It helps identify usability problems before conducting user testing, reducing cost and effort.
- **Key Steps/Principles**:
  i. **Briefing Session**: Evaluators are briefed about the goals and scope of the evaluation.
  ii. **Evaluation Period**: Evaluators independently go through the interface twice to assess overall functionality and specific details.
  iii. **Debriefing Session**: Evaluators meet to discuss problems found, prioritize them, and suggest fixes.
- **Who Created It and When**: Jakob Nielsen developed this method in the early 1990s, with the first formal set of heuristics in 1994.

2. Cognitive Walk-Through

- **Definition**: An inspection method that involves simulating a user's problem-solving process to evaluate how easily users can learn an interface by exploration.
- **When and Why It Is Used**: Used for assessing ease of learning and the effectiveness of an interface for novice users. Useful for systems that expect users to learn through exploration.
- **Key Steps/Principles**:
  i. **Identify Typical Users**: Define characteristics of users and sample tasks.
  ii. **Evaluator Analysis**: A group of evaluators simulates a scenario to assess ease of use.
  iii. **Walk-Through**: Evaluators answer a set of questions:
    - Will the correct action be evident to the user?
    - Will the user notice the correct action?
    - Will the user associate and interpret the response correctly?
  iv. **Document Issues**: Document usability issues, reasons for them, and suggestions for improvements.
- **Who Created It and When**: Developed by Cathleen Wharton et al. in the early 1990s.

3. Pluralistic Walk-Through

- **Definition**: A collaborative evaluation method where developers, usability specialists, and end-users work together to walk through a task scenario.
- **When and Why It Is Used**: Suitable for safety-critical systems or when participatory design involving multiple disciplines is needed. It helps bring in multiple perspectives.
- **Key Steps/Principles**:
  i. **Role Assignment**: Each participant plays the role of a typical user.
  ii. **Scenario-Based Evaluation**: Users walk through scenarios independently, then discuss them as a group.
  iii. **Discussion and Consolidation**: The group discusses usability issues after each scenario.
- **Who Created It and When**: The concept was developed by Nielsen and Mack in 1994.

4. Web Analytics

- **Definition**: A method of collecting, analyzing, and reporting data on user interactions on websites.

- **When and Why It Is Used**: Used to evaluate website performance and understand user behavior in real-time. Helps assess traffic, popular content, and underused pages to optimize UX.
- **Key Steps/Principles**:
  i. **Data Collection**: Set up analytics tools such as Google Analytics to collect user activity data.
  ii. **Analysis**: Analyze metrics such as page visits, bounce rate, session duration, and conversion rates.
  iii. **Reporting**: Use dashboards to report on trends, user demographics, and behavior patterns.
- **Who Created It and When**: Google Analytics was first launched by Google in 2005.

5. A/B Testing

- **Definition**: A controlled experiment comparing two versions of a design to determine which performs better on certain metrics.
- **When and Why It Is Used**: Used to evaluate UX changes by comparing control and experimental groups online. Helps identify subtle design improvements that lead to significant changes in behavior.
- **Key Steps/Principles**:
  i. **Identify Variable**: Define what will be changed, such as the layout or color scheme.
  ii. **Select Participants**: Randomly assign users to control and experimental groups.
  iii. **Run Experiment**: Collect data over a set period, comparing key performance indicators.
  iv. **Analyze Results**: Conduct statistical analysis to determine which version performed better.
- **Who Created It and When**: Developed from controlled experiment methodologies. Ron Kohavi is a notable contributor to its application in UX evaluation (2015).

6. Fitts' Law

- **Definition**: A predictive model used to estimate the time required to reach a target, based on its size and distance from the starting point.
- **When and Why It Is Used**: Useful for optimizing layouts and positioning interactive elements on physical or virtual interfaces to maximize efficiency.
- **Formula**:
  - $T = k * \log2(D/S + 1)$, where
    - T = time to move to a target
    - D = distance to the target
    - S = size of the target
    - k = constant (approx. 200 ms/bit)
- **Key Steps/Principles**:
  i. **Identify Targets**: Define the interactive elements (buttons, icons, etc.) to be evaluated.
  ii. **Apply Model**: Use the formula to calculate and compare times for different layouts.
  iii. **Iterate Design**: Modify design to reduce the time needed to reach key targets.
- **Who Created It and When**: Paul Fitts developed this law in 1954.

These methods and models play a significant role in user experience evaluation, enabling designers to improve usability, predict user performance, and validate changes in a systematic and user-focused manner.