UNIVERSITI TEKNOLOGI MALAYSIA

Big Data And Artificial Intelligent New Innovation

Smart Cities And Infrastructure

Group: Enigma

20 Februari 2025

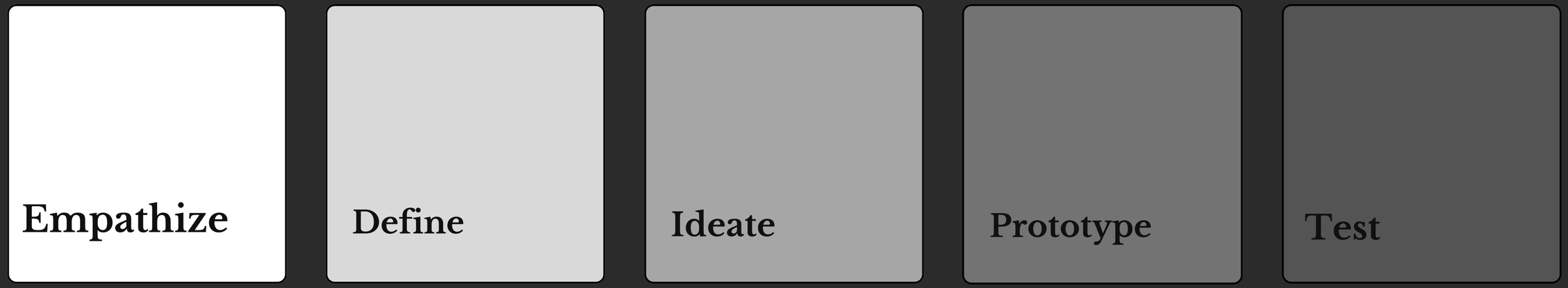
Big Data and AI are transforming urban infrastructure by enabling smarter, more efficient, and sustainable cities. As urbanization accelerates, challenges such as traffic congestion, resource management, and environmental sustainability demand innovative solutions.

This presentation explores how Big Data and AI, combined with the Design Thinking Process, drive smart city advancements. By following key phases—Empathize, Define, Ideate, Prototype, and Test—urban planners can develop AI-powered solutions that enhance city operations and improve residents' quality of life.

Smart cities leverage advanced technologies such as Big Data and Artificial Intelligence (AI) to improve urban infrastructure, optimize resource management, and enhance the quality of life for residents.

By utilizing Design Thinking, urban planners and engineers can create innovative solutions that address the challenges of modern cities. This report outlines the application of Design Thinking in smart city development.

The Five Stages Of Design Thinking



Gain a deep understanding of the users and their needs.

Identify key urban challenges

Brainstorming innovative solutions

Develop a Minimum Viable Product (MVP)

Evaluate the prototypes with users, gather feedback, and refine the solutions.

Empathize

Methods:

- Surveys & interviews with residents
- Creating user personas

Example:

- Survey on traffic congestion and public transport efficiency.

Visual:

- Infographic showing survey results or user personas

Define Phase

Challenges:

- Traffic congestion, waste management, energy inefficiency

Example:

- Need for a real-time AI-powered traffic optimization system"

Visual:

- Problem statement in a highlighted box

Ideate Phase

Examples:

- AI-driven smart grids
- IoT-powered traffic management

Methods:

- Group discussions, mind mapping

Visual:

- A brainstorming map with solution ideas

Prototype Phase

Examples:

- Real-time dashboard monitoring air quality & traffic
- IoT sensor testing for optimal placement

Visual:

- Mockup of a dashboard prototype

Test Phase

Methods:

- Testing in select areas, surveys with users

Example:

- Users testing a smart traffic light system and reporting reduced congestion"

Visual:

- Chart showing feedback data

Many cities struggle with efficient infrastructure management, leading to issues like traffic congestion and high energy consumption.

Efficient Infrastructure Management Challenges:

- Traffic congestion
- High energy consumption
- Inefficient resource allocation
- Poor public service management

AI-powered smart city infrastructure that enhances urban planning and public service management.

- Urban Planning Enhancements:
  - Real-time traffic optimization using AI sensors
  - Smart grid for energy-efficient power distribution

- Public Service Management:
  - AI-driven waste management systems
  - IoT-enabled air quality monitoring

Team Collaboration:

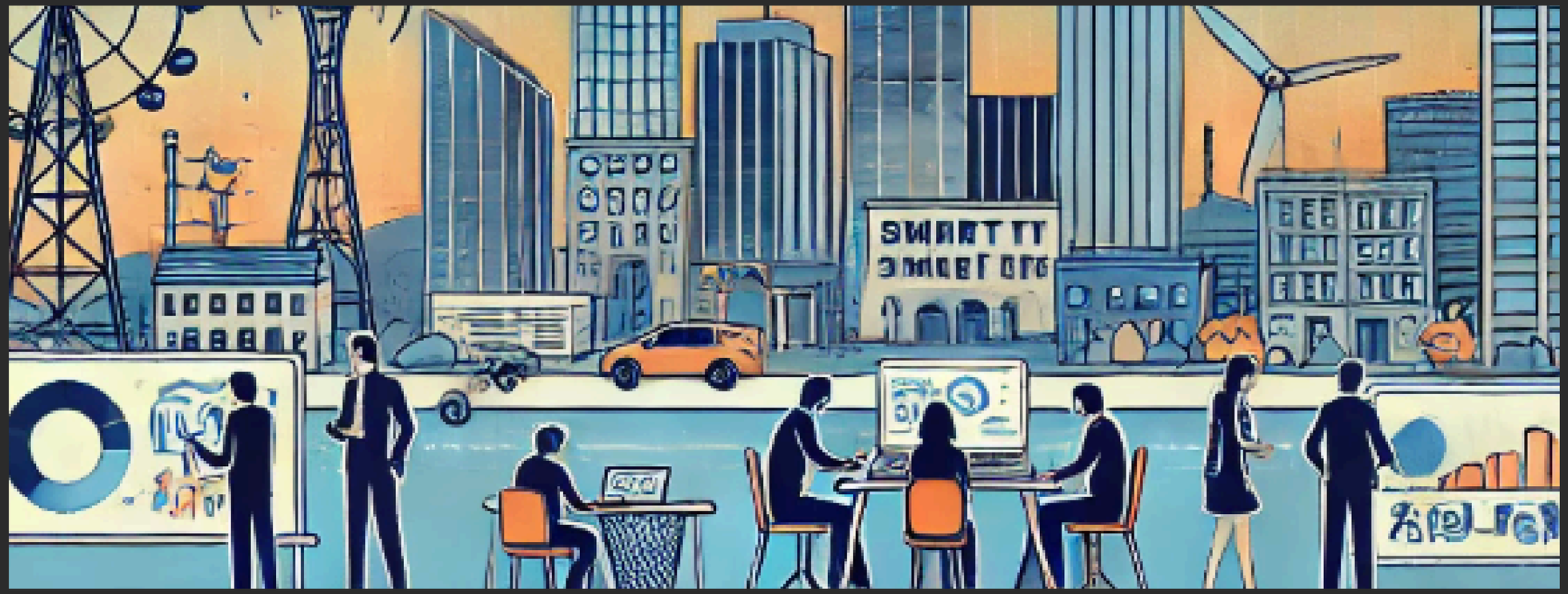
- Weekly Meetings:
  - Regular updates and progress reviews
  - Collaborative brainstorming sessions
- Assigned Roles:
  - Clear responsibilities for each team member
  - Specialized tasks based on expertise
- Progress Tracking:
  - Shared documentation for transparency
  - Use of project management tools

Key Assessment Points

- Evaluating Solution Effectiveness:
  - Are smart city solutions meeting user needs?
  - Performance measurement during project demonstrations.

- Assessing Design Thinking Transitions:
  - Ensuring smooth progression between Empathize, Define, Ideate, Prototype, and Test phases.
  - Identifying areas for refinement and enhancement.

- **Empathize to Define**: Do user insights accurately shape problem statements?
- **Define to Ideate**: Are ideas aligned with the identified challenges?
- **Prototype to Test**: Are pilot tests providing actionable feedback?
- **Continuous Refinement**: Iterative improvements based on test results.



Design Thinking Evidence

- User interviews and surveys to establish empathy.
- Documented problem definitions and brainstorming sessions.
- Prototype development screenshots and user feedback analysis.

The application of design thinking in the development of big data and AI-driven solutions for smart cities has proven to be an effective approach. By following the five phases of design thinking, empathize, define, ideate, prototype, and test we were able to create a solution that addresses key urban challenges such as traffic congestion, energy inefficiency, and waste management. The process not only helped us develop a technically sound solution but also ensured that it was aligned with the needs and expectations of city residents.

UNIVERSITI TEKNOLOGI MALAYSIA

SUMATHI KESAVAN
SX212327ECJHF03

MUHAMMAD AIZAT BIN AB RASHID
SX220320ECJHS03

MUHAMMAD FARHAN BIN MOHD IZHAR
SX212313ECJHF03

MUHAMMAD SYAFIQ BIN MOHD ZAFRI
SX211667ECJHF03

ZAIDI BIN AHMAD
SX222136ECJHF03

Thank You

Group: Enigma