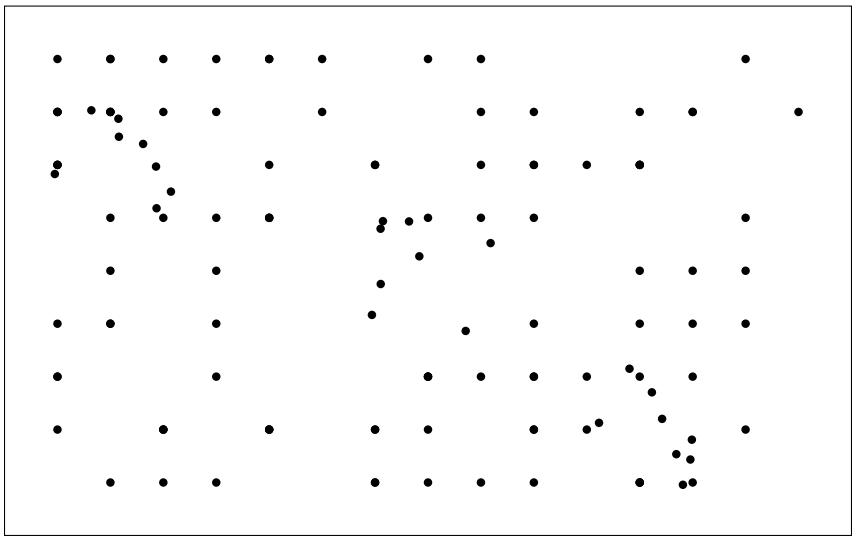
# Pattern Discovery Worksheet

Pre-Session Activity

Machine Learning for Innovation - Week 1

## Exercise 1: The Sorting Challenge

**Task:** Look at the dots below. Group them into categories by drawing circles around dots that belong together.



**Questions:**

1. How many groups did you find? _____

2. How long did this take you? _____

3. What if there were 10,000 dots instead of 100? How long would it take? _____

4. What rule did you use to decide which dots belong together?

   _____

   _____

## Exercise 2: The Innovation Challenge

**Task:** Below are 30 innovation concepts. Organize them into meaningful categories. Write the category names and list which innovations belong in each.

| | |
|---|---|
| Electric transportation | Photo sharing |
| Music streaming | Instant messaging |
| Video communication | Online marketplaces |
| Food delivery automation | Video streaming |
| Digital payments | Virtual reality |
| Remote healthcare | 3D printing |
| Social networking | Drone delivery |
| Cloud storage | Artificial intelligence |
| Voice assistants | Gene editing |
| Renewable energy | Autonomous vehicles |
| Online education | Blockchain |
| Fitness tracking | Augmented reality |
| Smart home devices | Quantum computing |
| Cryptocurrency | Internet of things |
| Ride sharing | Sustainable packaging |

**Your Categories:**

1. Category 1: _____
   Items: _____

2. Category 2: _____
   Items: _____

3. Category 3: _____
   Items: _____

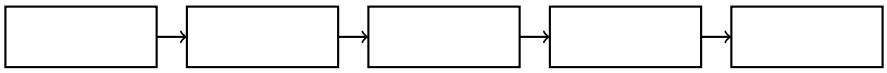
4. Category 4: _____
   Items: _____

**Questions:**

1. Were some innovations hard to categorize? Which ones? _____
2. Could the same innovation fit multiple categories? _____
3. What if you had 5000 innovations to sort? _____

## Exercise 3: Technical Process Sequencing

**Task:** Below are five stages of a technical analysis process, listed alphabetically. Place them in the correct operational sequence.



**Stages (alphabetical):**

- **Deploy**: Put solution into production
- **Data**: Collect raw information
- **Evaluate**: Test solution performance
- **Model**: Build computational solution
- **Preprocess**: Clean and prepare information

**Questions:**

1. Why must this sequence be followed strictly? _____

   _____

2. What happens if you skip the second step? _____

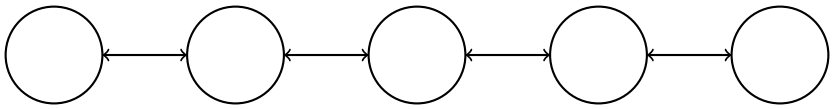
3. At which step do errors become most costly? _____

4. Which step requires the most computational resources? _____

5. Can any two steps be performed simultaneously? _____

## Exercise 4: Human-Centered Process Sequencing

**Task:** Below are five stages of a human-centered problem-solving process, listed alphabetically. Arrange them in logical sequence.



**Stages (alphabetical):**

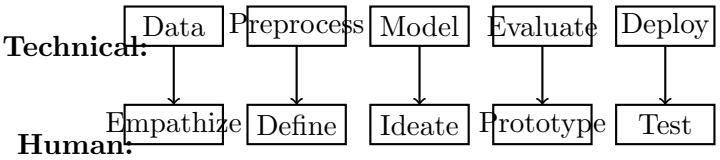
- **Define**: Articulate the problem
- **Empathize**: Understand user needs
- **Ideate**: Generate potential solutions
- **Prototype**: Build preliminary solution
- **Test**: Validate with users

**Questions:**

1. Unlike the technical process, why are the arrows bidirectional? _____
   _____
2. Which stage requires the most human interaction? _____
3. Can you begin at stage 3? Why or why not? _____
   _____
4. How does stage 1 inform stage 2? _____
5. Why might you return to stage 1 after stage 5? _____

## Exercise 5: Methodological Integration

**Task:** Identify how each technical stage could inform the corresponding human-centered stage.




**Analysis Questions:**

1. How does "Data" inform "Empathize"? _____

2. How does "Define" constrain "Preprocess"? _____

3. Where is the strongest connection? Why? _____

4. Where is the weakest connection? Why? _____

5. What is lost if these pipelines operate independently? _____

6. Identify one feedback loop between pipelines: _____

## Reflection: Methodological Synthesis

Synthesize your observations from all exercises:

1. Compare the rigidity of technical versus human-centered processes:

2. Explain why iteration is essential in one pipeline but problematic in the other:

3. Identify the primary constraint in each pipeline:

4. Describe how quantitative and qualitative methods complement each other:

5. What is the epistemological difference between "Model" and "Ideate"?

6. Propose how automation could enhance human-centered design:

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*In our first session, we will explore how these two pipelines converge to create innovation opportunities through the systematic application of machine learning to design thinking challenges.*