# **Process Mining: Taming Complexity and Driving Improvement**

## **From Spaghetti to Structure: Why and How to Optimize Your Processes**

### **Part 1: The Challenge of Complexity**

#### **What is Process Mining?**

Process mining is a technique that uses data from your IT systems to create a visual and analytical model of your actual business processes. It helps you understand what is *really* happening, not just what you *think* is happening.

#### **The "Spaghetti Model" Problem**

When you first apply process mining to raw event data, you often get a "spaghetti model." This is a process map that is so complex and tangled with different paths and variations that it's nearly impossible to understand.

**Image: A classic "spaghetti model" of a complex process.**

**Why does this happen?**

* **High Granularity:** Every single click, every small step is recorded as a separate event.
* **Numerous Variations:** In any real-world process, there are many different ways to get from start to finish.
* **Exceptions and Errors:** The model includes all the one-off exceptions and error-handling paths.

### **Part 2: The Solution - Leveling and Grouping**

To make sense of the spaghetti, we need to simplify the model. This is done through **leveling** and **grouping**.

#### **What is Leveling?**

Leveling involves creating different views of the process at various levels of detail. You can zoom in to see the fine-grained events or zoom out to see a more generalized overview.

* **Level 1: Generalization:** A high-level view of the main process stages.
* **Level 2: Specialization:** A more detailed view of the activities within each stage.
* **Level 3: Granular Events:** The raw, detailed event data.

#### **What is Grouping?**

Grouping involves combining related low-level events into higher-level business activities. This makes the process map much cleaner and easier to understand.

**Example:**

Instead of seeing:

"Open CRM" -> "Search for Customer" -> "Click on Contact Info" -> "Open Email Client" -> "Compose Email" -> "Send Email"

You can group these into a single activity:

"Contact Customer"

**Image: A simplified process model after leveling and grouping.**

### **Part 3: Hierarchical Analysis for Complex Journeys**

For cases or journeys with a huge number of events, even leveling and grouping might not be enough. The best approach is to break down the entire journey into a hierarchy.

#### **Divide and Conquer: Process Decomposition**

Instead of analyzing one monolithic process, you can deconstruct it into manageable layers:

* **Main Process:** The end-to-end journey (e.g., "Order to Cash").
* **Sub-Process:** A major stage within the main process (e.g., "Order Fulfillment").
* **Sub-of-Sub-Process:** A specific set of tasks within a sub-process (e.g., "Packaging and Shipping").

This creates a logical structure that is easier to navigate and understand.

#### **Focused Analysis at Every Level**

The key benefit of this hierarchical approach is the ability to perform **isolated process mining and variant analysis at each level**.

* You can analyze the "Order Fulfillment" sub-process on its own to identify its specific bottlenecks and variations, without the noise from the rest of the "Order to Cash" journey.
* This allows for a much deeper and more precise analysis, revealing localized inefficiencies that would be invisible in a high-level view.
* By optimizing each sub-process individually, you contribute to the efficiency of the entire end-to-end journey.

### **Part 4: Discovering New Variants and Continuous Improvement**

Once you have a clear and understandable process model (whether at the main or sub-process level), you can start to analyze it for improvement opportunities.

#### **The Variant Explosion Problem**

If you analyze a process at its most granular level, you'll face an explosion of variants. A tiny, insignificant change—like an extra mouse click or a momentary system delay—creates an entirely new variant. This can result in thousands or even tens of thousands of variants for a single process.

With so many variants, **meaningful comparative analysis becomes impossible**. You can't distinguish the "happy path" from minor deviations or critical exceptions because everything looks unique.

#### **How Leveling and Grouping Solve This**

This is where leveling and grouping become critical for analysis. By grouping low-level events into meaningful business activities, you drastically reduce the number of variants. This allows you to:

* **Focus on what matters:** Perform variant analysis on the activities you are actually concerned with (e.g., "Approve Invoice," "Ship Product").
* **Enable comparison:** With a manageable number of variants, you can effectively compare them to identify the most common paths, analyze performance differences, and spot significant deviations.

#### **What are Process Variants?**

A process variant is a unique path or sequence of activities from the start of a process to the end. By analyzing these variants (at the appropriate level), you can:

* **Identify the "Happy Path":** The most common and efficient way the process is executed.
* **Discover Deviations:** See where and why the process deviates from the ideal path.
* **Uncover Hidden Inefficiencies:** Find bottlenecks and redundant steps that are slowing down the process.

**Image: A diagram showing different process variants.**

#### **The Cycle of Continuous Improvement**

Process mining is not a one-time project. It's a continuous cycle of discovery, analysis, and improvement.

1. **Discover:** Use process mining to visualize your current process.
2. **Analyze:** Identify bottlenecks, deviations, and inefficiencies.
3. **Improve:** Implement changes to address the issues you've found.
4. **Monitor:** Use process mining to track the impact of your changes and ensure they are having the desired effect.

**Image: The continuous improvement loop.**

### **Conclusion: Key Takeaways**

* Raw event data often leads to complex "spaghetti models."
* **Leveling** and **grouping** are essential for creating clear process maps and, crucially, for **taming the variant explosion** to make analysis possible.
* For highly complex journeys, a **hierarchical breakdown** into processes and sub-processes is the most effective strategy.
* **Variant analysis**, when performed on properly leveled data, helps you discover meaningful insights and opportunities for improvement.
* Process mining is a powerful tool for driving **continuous improvement** and optimizing your business processes.