

# A Visualization Approach for Difference Analysis of Process Models and Instance Traffic

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# Overview

- Background & Motivation
- Difference Model
- Instance Traffic
- Use Cases
- Conclusion



# Background & Motivation

- Support in analyzing **process models** and **their instances** with regard to their **differences** and **commonalities**.



- The need to manage the **increasing number of process models** and their **instances** that can accumulate in organizations over the years.
- Understanding **if** and **how the traffic** has changed **helps to** distinguish **well-designed models** from models that **require modifications**.
- The range of the **use cases** is broad, e.g.:
  - Process model variants
  - Process model versions
  - Comparison of a predefined model with a derived process model from event logs
  - Merged process models

# Background & Motivation

- Visualizations of difference model and traffic **are helpful**, because they:
  - support users to **understand the difference** and their dependencies easier
  - allow users to **build valuable knowledge**, which supports them in their decisions
  - make things **visible or present things in a new light** of which users were not aware of before

- What are the differences between two process models?
- In which areas are they different?



# Difference Model

- Given two process models ( $PM_1$  and  $PM_2$ ) we can compute the difference model DM to highlight the differences between them in a single drawing.

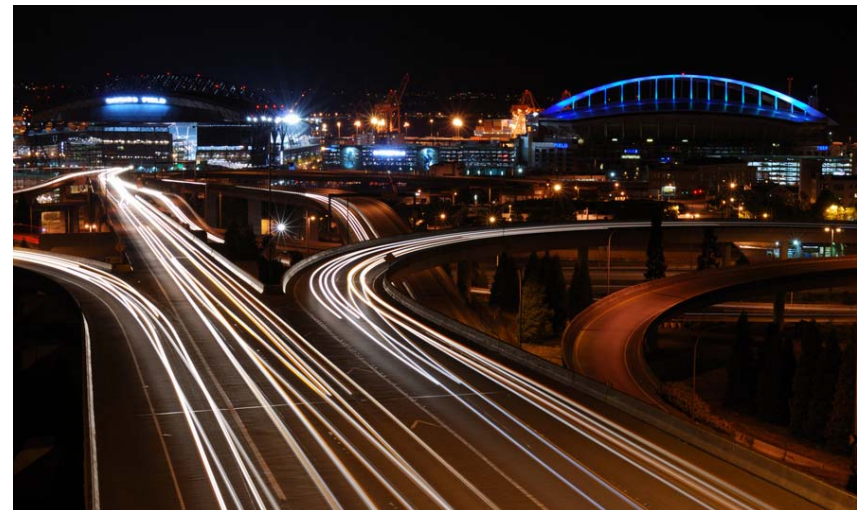
$$DM = PM_2 - PM_1$$

- Generally speaking this is done by calculating the relative difference of the nodes and edges of a directed connected graph.
- Note: We defined a process model as a directed connected graph and we are looking at the processes from the control flow perspective



# Instance Traffic

- The difference model can be extended by considering **how often control edges have been executed** by individual instances to observe the **distribution of instances over the different paths** through the process model.
- Relative instance traffic is calculated by the difference between **the instance traffic** of  $PM_1$  and  $PM_2$ .



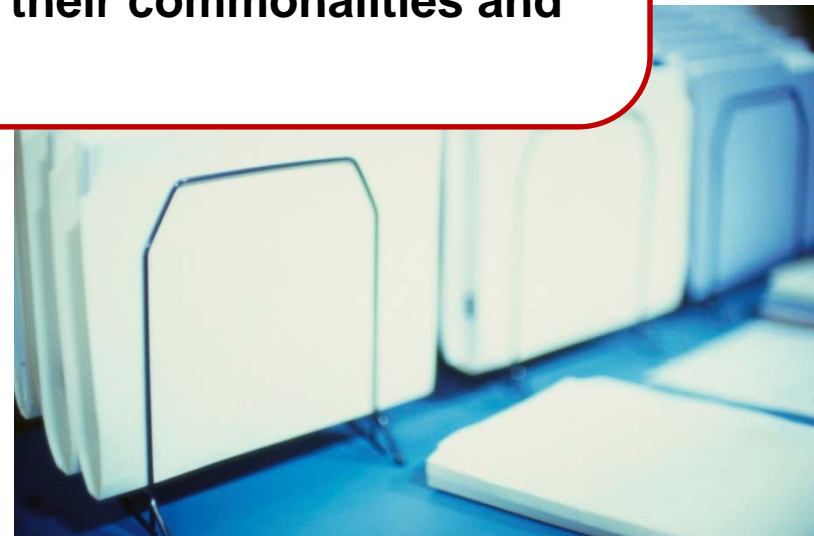
# Use Cases

- **Use Case 1:** Comparison of two process variants
- **Use Case 2:** Comparison of instance traffic between two process versions
- **Use Case 3:** Comparison of instance traffic of a process model between two time periods



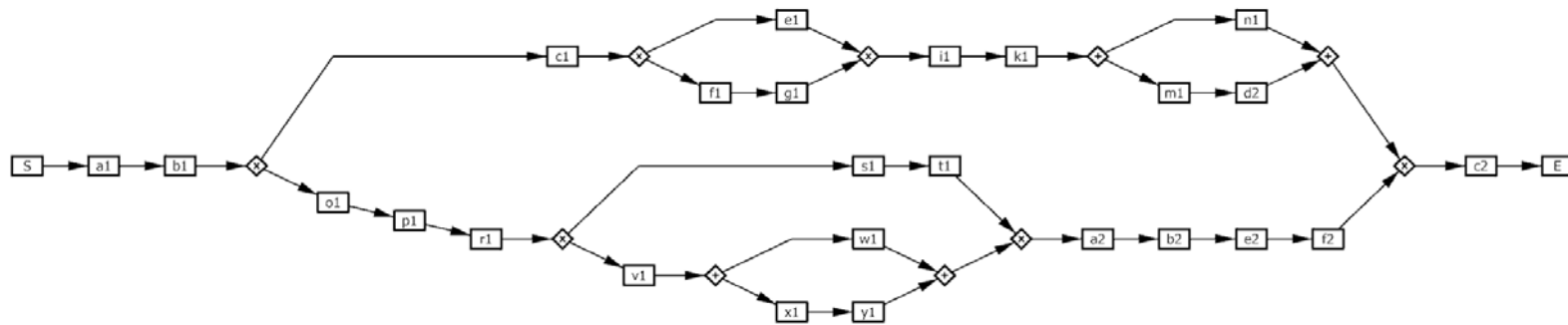
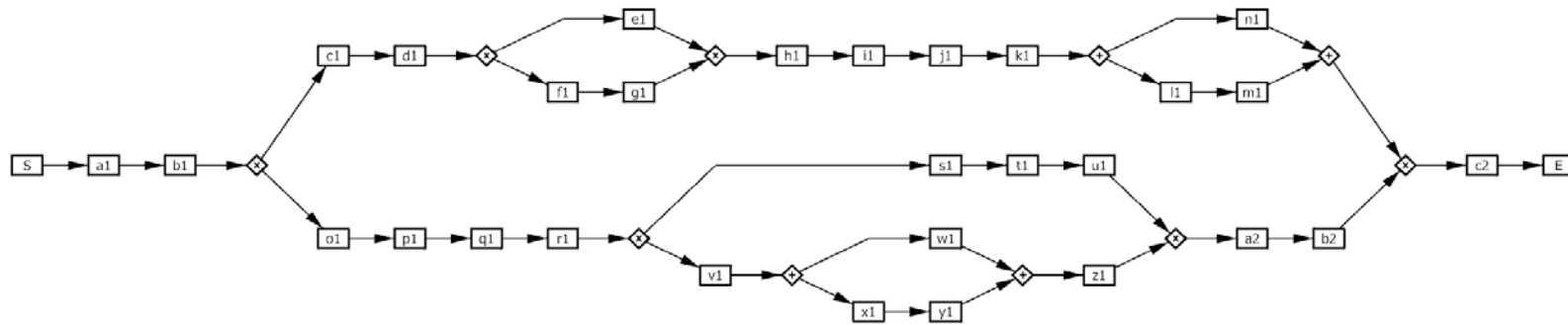
# Use Cases

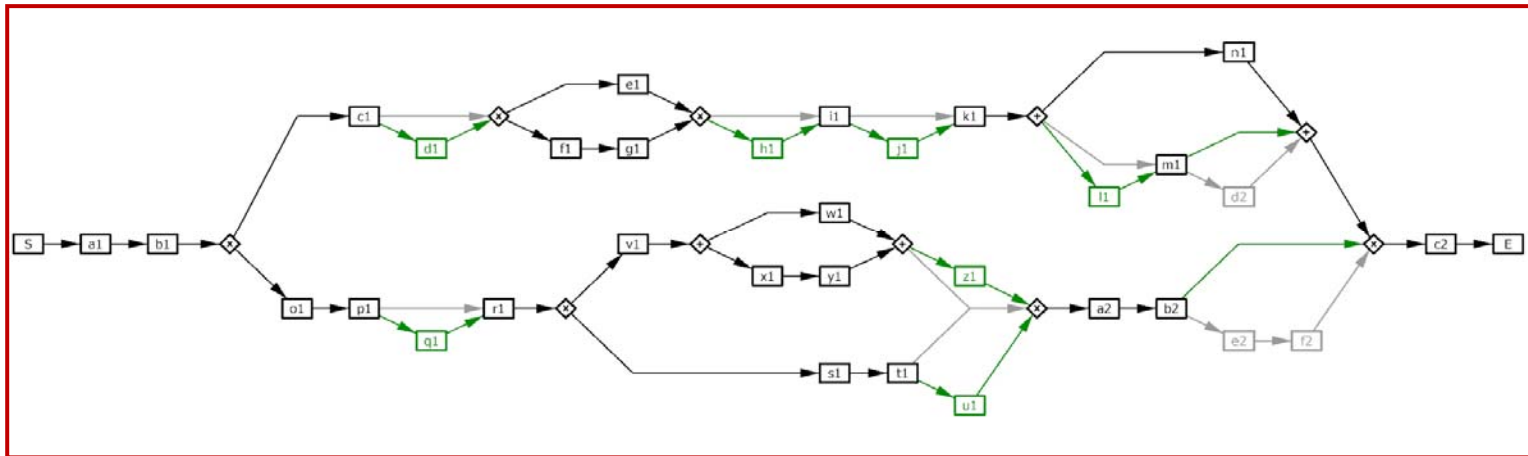
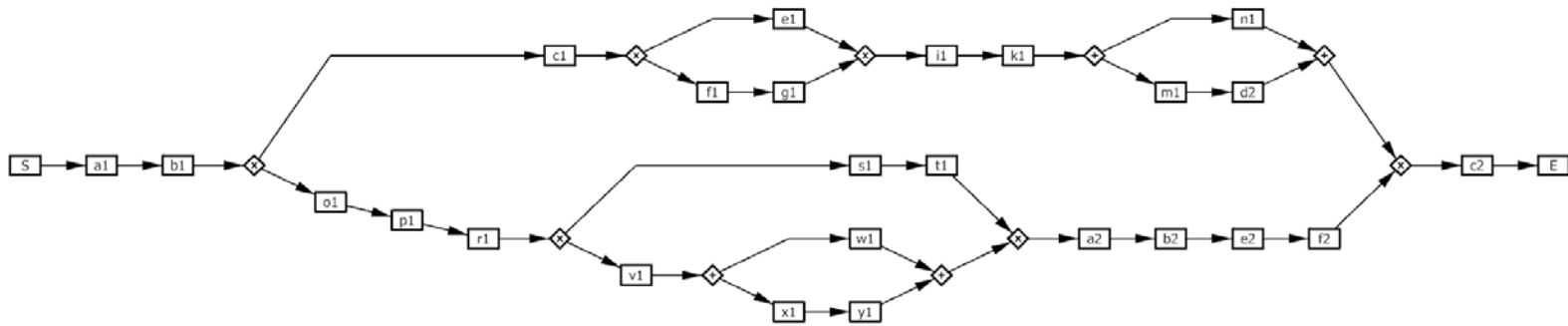
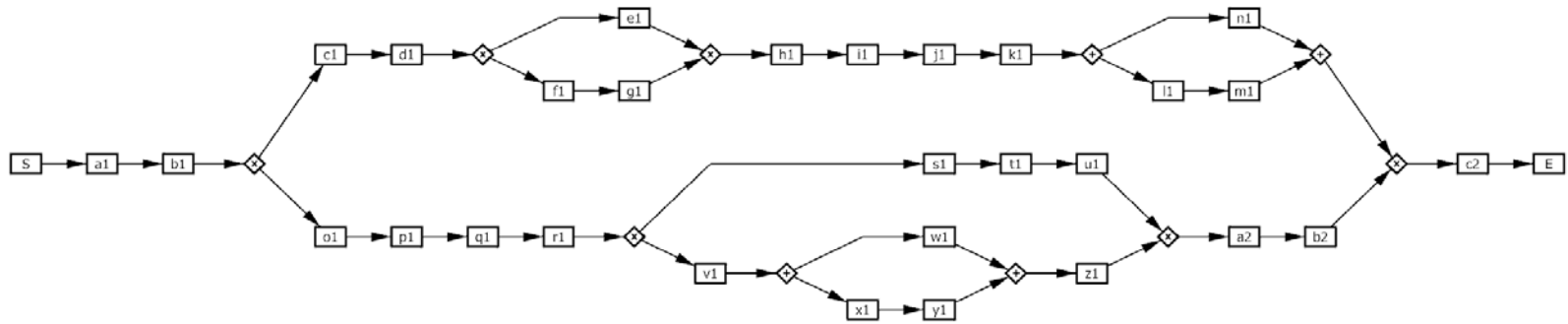
- **Use Case 1:** Comparison of two process variants
- **Use Case 2:** Comparison of instance traffic between two process versions
- **Use Case 3:** Comparison of two process variants in order to **identify redundant ones.**
- **Use Case 4:** Analysts can use the difference graph to compare the different process variants in order to identify **their commonalities and differences.**





# Use Case 1



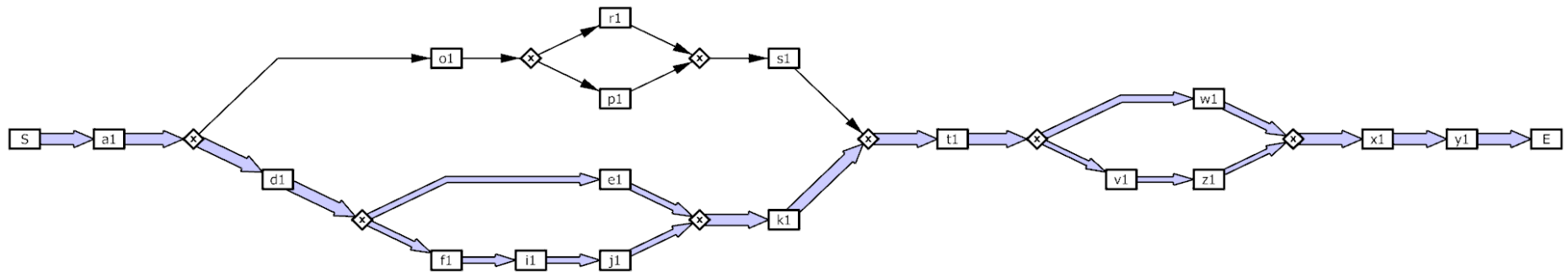
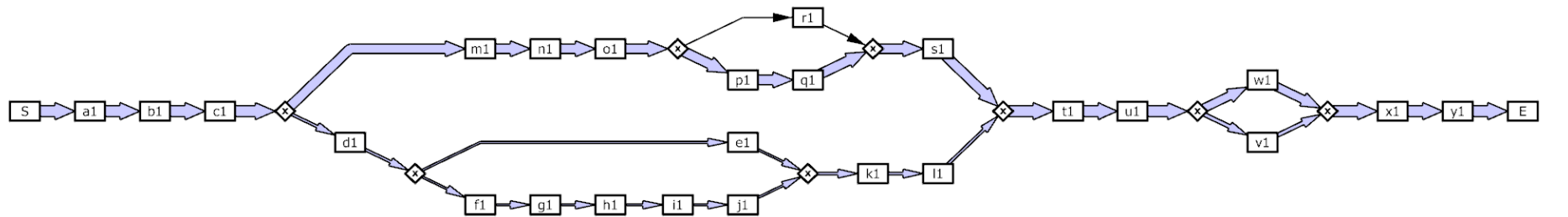


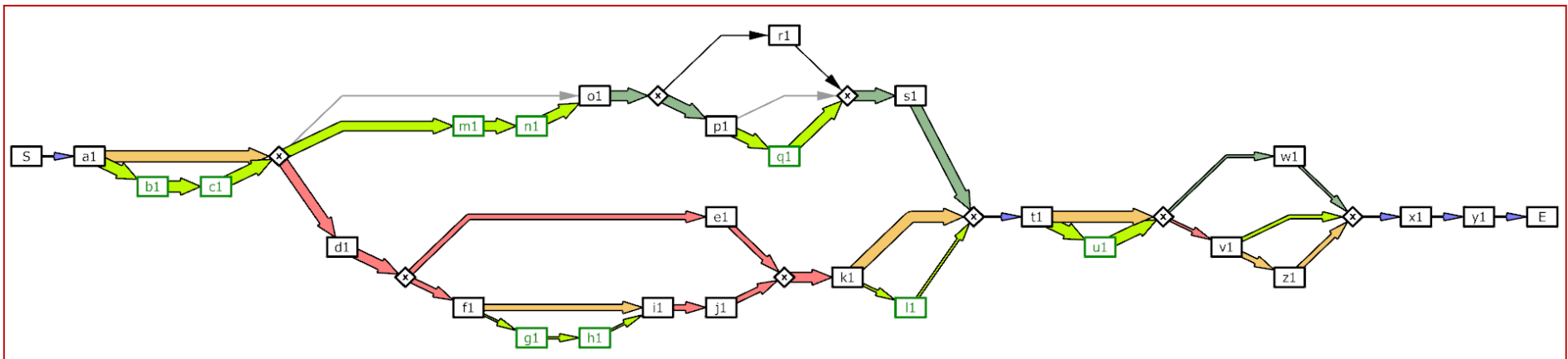
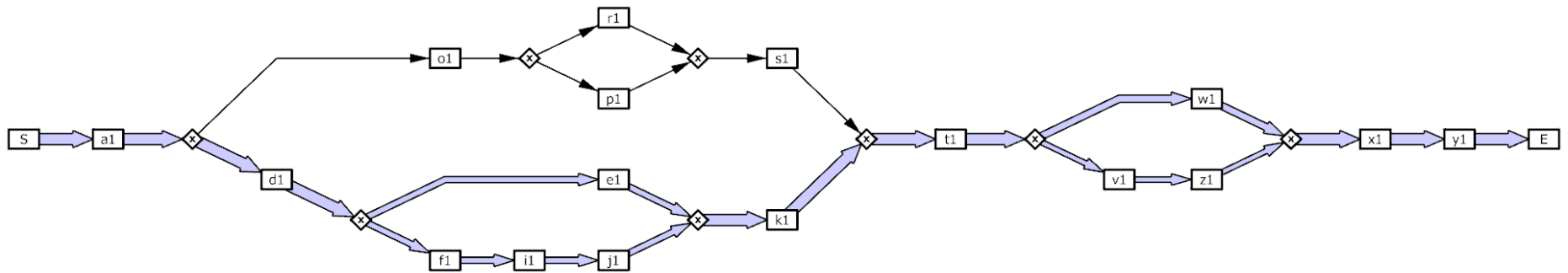
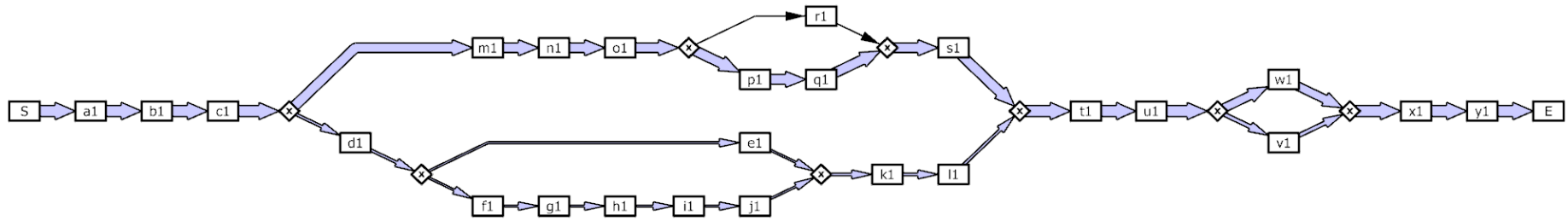
# Use Cases

- **Use Case 1:** Comparison of two process variants
- **Use Case 2:** Comparison of instance traffic between two process versions
- **Use Case 3:** Comparison of instance traffic between two process versions
  - Organizations are often confronted with the need to adapt their business process **to react to new or changed environmental conditions.**
  - The comparison of the different process versions and their instance traffic helps **to analyze the impact of changes.**



# Use Case 2

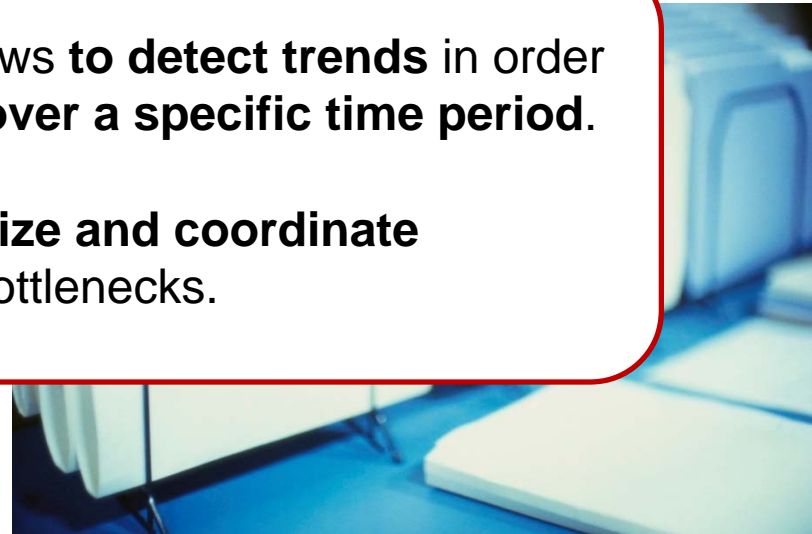




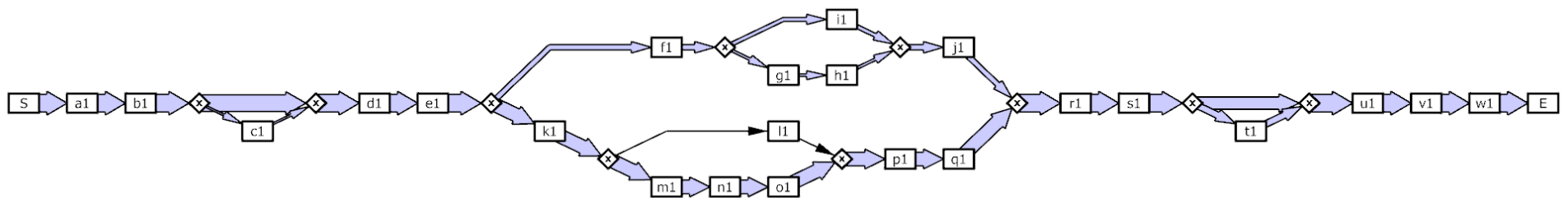
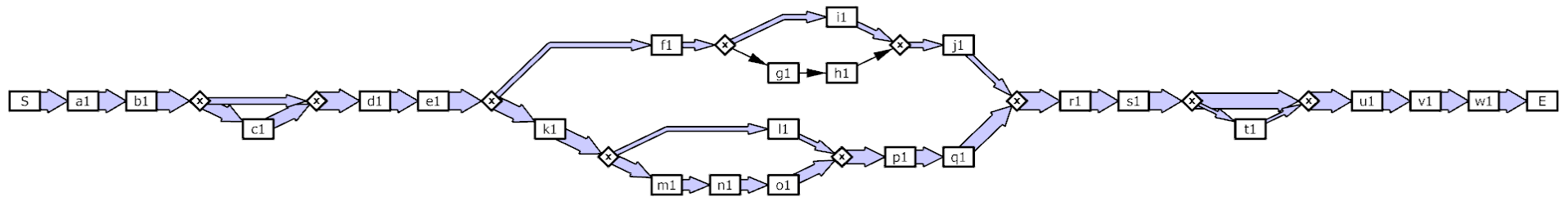
# Use Cases

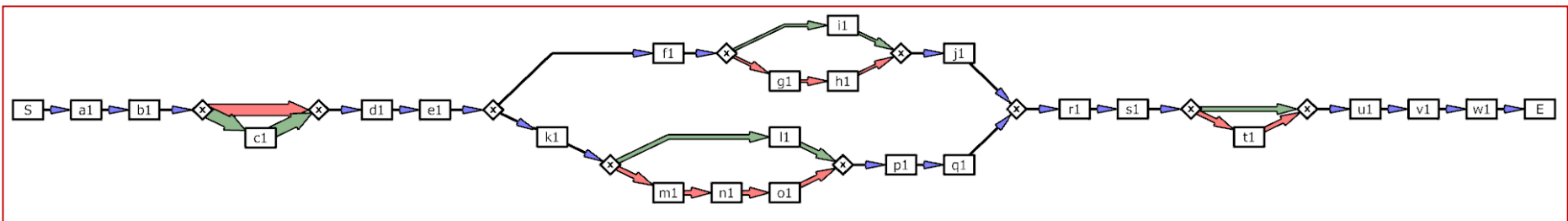
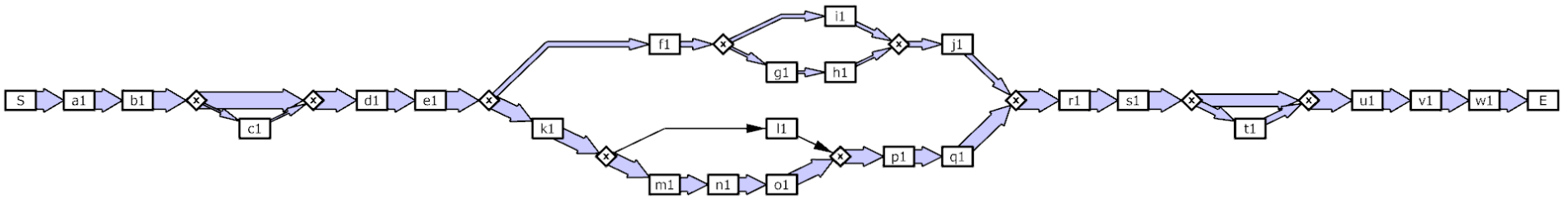
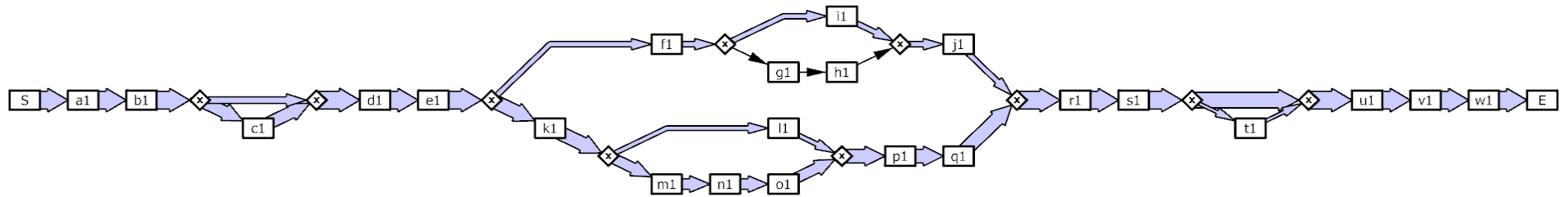
- **Use Case 1:** Comparison of two process variants
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- The analysis of instance traffic allows **to detect trends** in order to see **how processes changed over a specific time period.**
- The trend analysis **helps to optimize and coordinate processes** in order to avoid any bottlenecks.



# Use Case 3







# Conclusion

- The difference model representation is helpful for **explorative** and **comparative** tasks.
- The analysis of **instance traffic** is especially from interest **to understand** if and how changes will affect **the flow of instances**.
- A benefit of our approach is that it does **not require a change-log**.
- **Future Work:** to extend the visualization approach to provide further information about **the execution state** (e.g., started, suspended, and completed) of **instances and change operations**.



# Thank You

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