Chapter 11
Analyzing “Lasagna Processes”

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Overview

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Chapter 3 Data Mining

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How can process mining help?

- Detect bottlenecks
- Detect deviations
- Performance measurement
- Suggest improvements
- Decision support (e.g., recommendation and prediction)

- Provide mirror
- Highlight important problems
- Avoid ICT failures
- Avoid management by PowerPoint
- From “politics” to “analytics”
Example of a Lasagna process: WMO process of a Dutch municipality

Each line corresponds to one of the 528 requests that were handled in the period from 4-1-2009 until 28-2-2010. In total there are 5498 events represented as dots. The mean time needed to handled a case is approximately 25 days.
WMO process
(Wet Maatschappelijke Ondersteuning)

• WMO refers to the social support act that came into force in The Netherlands on January 1st, 2007.
• The aim of this act is to assist people with disabilities and impairments. Under the act, local authorities are required to give support to those who need it, e.g., household help, providing wheelchairs and scootmobiles, and adaptations to homes.
• There are different processes for the different kinds of help. We focus on the process for handling requests for household help.
• In a period of about one year, 528 requests for household WMO support were received.
• These 528 requests generated 5498 events.
C-net discovered using heuristic miner (1/3)
C-net discovered using heuristic miner (2/3)
C-net discovered using heuristic miner (3/3)
Conformance check WMO process (1/3)
Conformance check WMO process (2/3)
Conformance check WMO process (3/3)

The fitness of the discovered process is 0.99521667. Of the 528 cases, 496 cases fit perfectly whereas for 32 cases there are missing or remaining tokens.
Bottleneck analysis WMO process (1/3)
Bottleneck analysis WMO process (2/3)
Bottleneck analysis WMO process (3/3)

flow time of approx. 25 days with a standard deviation of approx. 28
Use cases for process mining

- **Goal:**
  - Improve KPIs related to **time**
  - Improve KPIs related to **costs**
  - Improve KPIs related to **quality**

- **Action:**
  - **Redesign** (improve process)
  - **Adjust** (improve control)
  - **Intervene** (handle problem in ad-hoc manner)
  - **Support** (detect, predict, recommend)
L* life-cycle model

For a Lasagna process all stages are applicable (in principle).
Lasagna processes are typically encountered in production, finance/accounting, procurement, logistics, resource management, and sales/CRM. Spaghetti processes are typically encountered in product development, service, resource management, and sales/CRM.
We applied ProM in >100 organizations

- **Municipalities** (e.g., Alkmaar, Heusden, Harderwijk, etc.)
- **Government agencies** (e.g., Rijkswaterstaat, Centraal Justitieel Incasso Bureau, Justice department)
- **Insurance related agencies** (e.g., UWV)
- **Banks** (e.g., ING Bank)
- **Hospitals** (e.g., AMC hospital, Catharina hospital)
- **Multinationals** (e.g., DSM, Deloitte)
- **High-tech system manufacturers and their customers** (e.g., Philips Healthcare, ASML, Ricoh, Thales)
- **Media companies** (e.g. Winkwaves)
- ...

Two Lasagna processes

RWS ("Rijkswaterstaat") process

WOZ ("Waardering Onroerende Zaken") process
The Dutch national public works department, called “Rijkswaterstaat” (RWS), has twelve provincial offices. We analyzed the handling of invoices in one of these offices.

The office employs about 1,000 civil servants and is primarily responsible for the construction and maintenance of the road and water infrastructure in its province.

To perform its functions, the RWS office subcontracts various parties such as road construction companies, cleaning companies, and environmental bureaus. Also, it purchases services and products to support its construction, maintenance, and administrative activities.
C-net discovered using heuristic miner
Social network constructed based on handovers of work

Each of the 271 nodes corresponds to a civil servant. Two civil servants are connected if one executed an activity causally following an activity executed by the other civil servant.
Social network consisting of civil servants that executed more than 2000 activities in a 9 month period.

The darker arcs indicate the strongest relationships in the social network. Nodes having the same color belong to the same clique.
WOZ process

• Event log containing information about 745 objections against the so-called WOZ (“Waardering Onroerende Zaken”) valuation.

• Dutch municipalities need to estimate the value of houses and apartments. The WOZ value is used as a basis for determining the real-estate property tax.

• The higher the WOZ value, the more tax the owner needs to pay. Therefore, there are many objections (i.e., appeals) of citizens that assert that the WOZ value is too high.

• “WOZ process” discovered for another municipality (i.e., different from the one for which we analyzed the WMO process).
The log contains events related to 745 objections against the so-called WOZ valuation. These 745 objections generated 9583 events. There are 13 activities. For 12 of these activities both start and complete events are recorded. Hence, the WF-net has 25 transitions.
Conformance checker: (fitness is 0.98876214)
Performance analysis

**Bottleneck detection:** Places are colored based on average durations.

Time required to move from one activity to another.

Information on total flow time.
Resource-activity matrix  
(four groups discovered)

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