

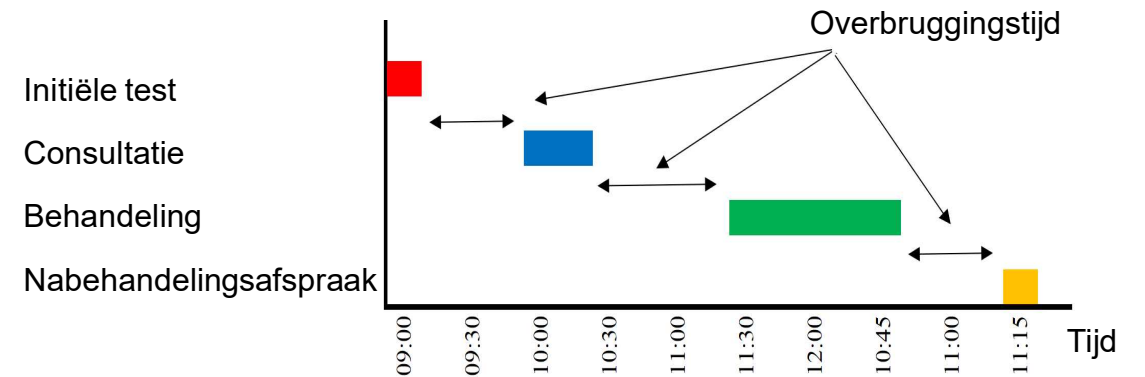
# Karakteriseren van laboratorium processen via process mining

Eline Tsai<sup>123</sup>, Derya Demirtas<sup>1</sup>, Richard Boucherie<sup>1</sup>,  
Hans Schotman<sup>2</sup>, Andrei Tintu<sup>3</sup>



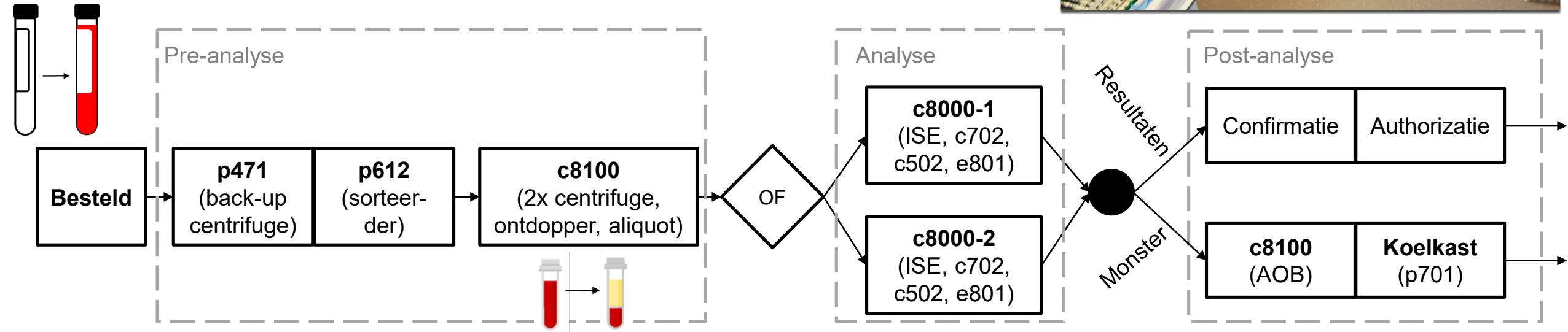
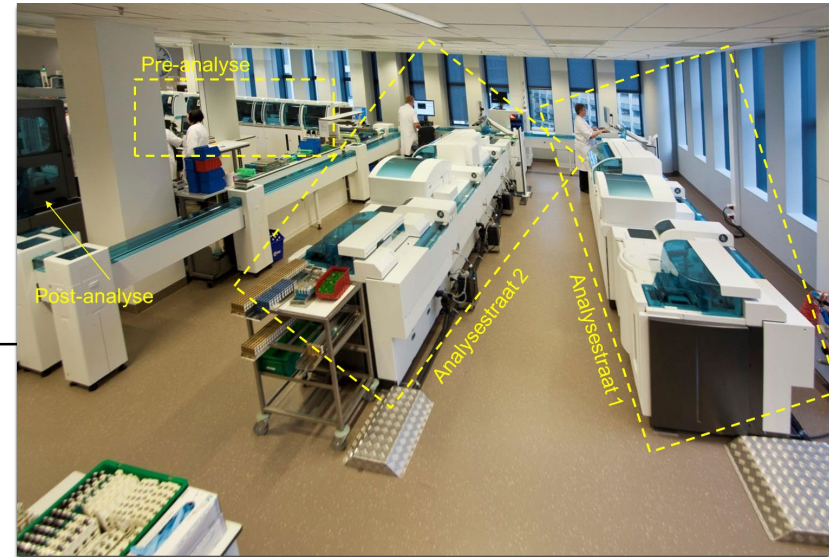
## Belang doorlooptijden lab

- Lab: hoge kwaliteit tests en resultaten op tijd
- Lab doorlooptijd cruciaal efficiënte en effectieve zorg
- Belangrijk om lab goed in te richten



Schematische weergave van een patienttraject [1]

## Setting: klinische chemie lab

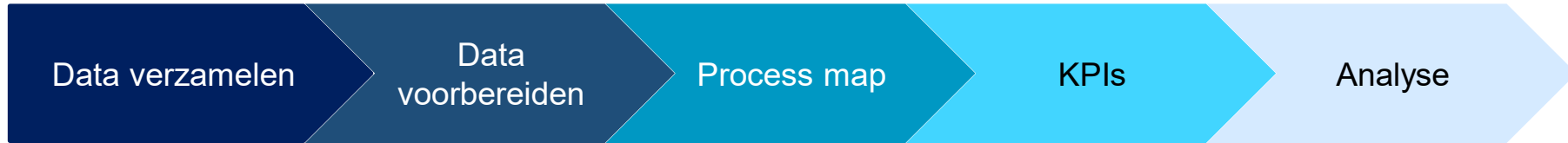


Wachten op testresultaten



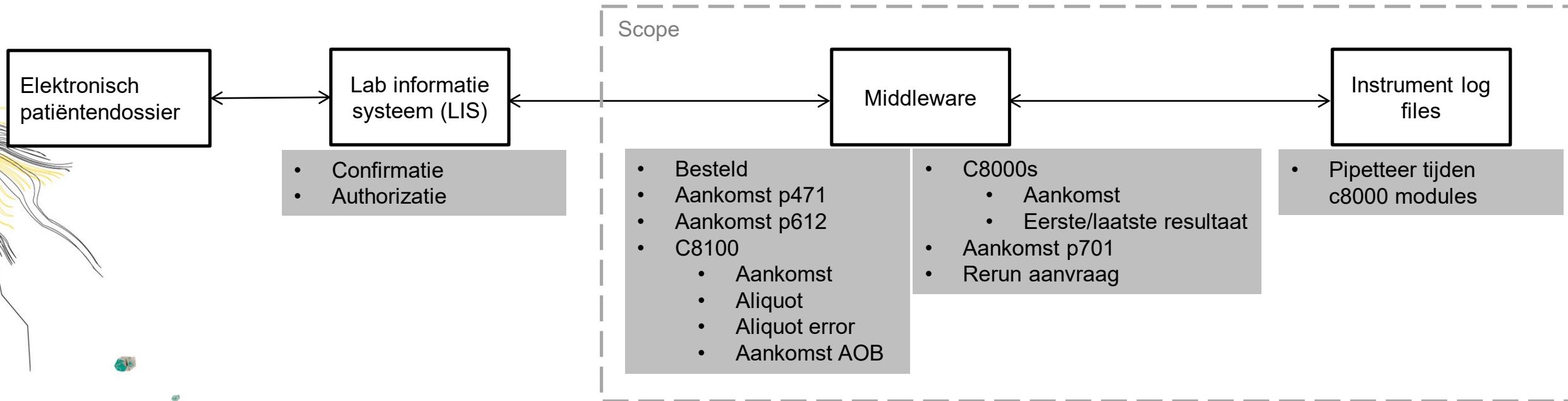
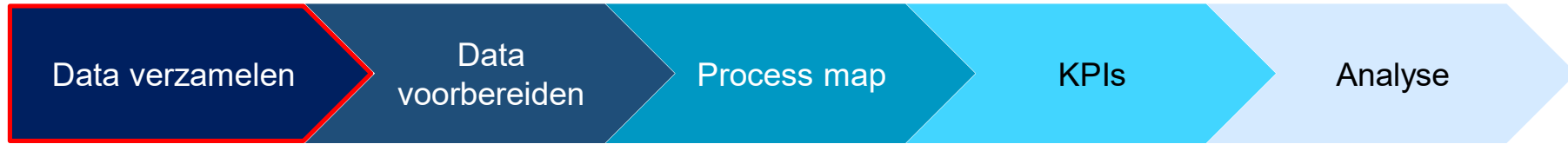
## Doel

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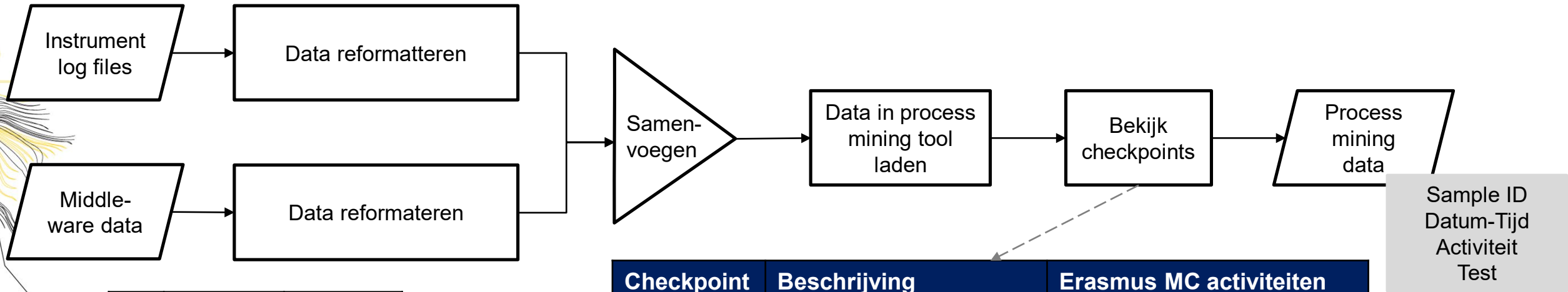
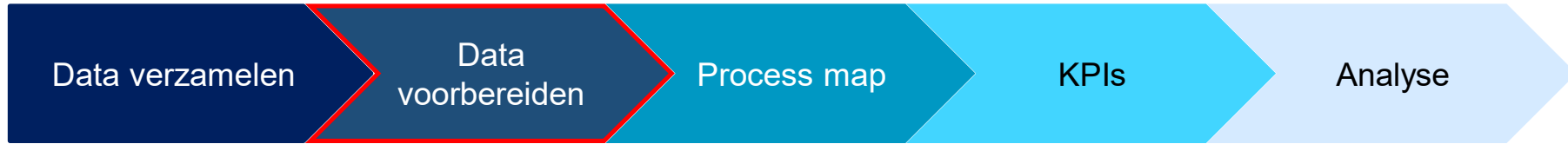


- Karakteriseren en inzichten krijgen lab processen
- Overvloed aan lab data is nog onderbenut
  - Data niet beschikbaar in gemakkelijk toegankelijke of interpreteerbare vorm
  - Hoe kan lab van ruwe data naar nuttige inzichten gaan?

# Methode



# Methode

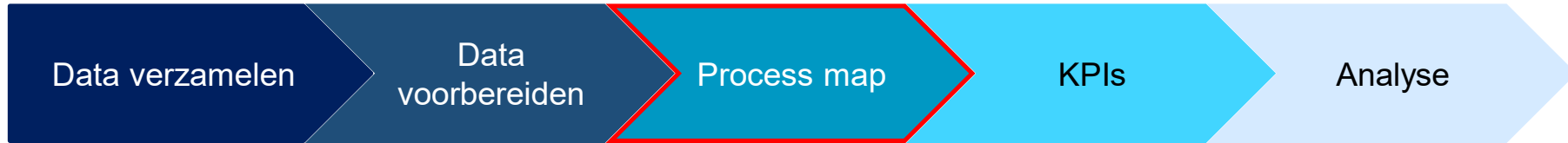


| ID  | Activiteit | Datum/tijd        |
|-----|------------|-------------------|
| 1   | Besteld    | 1-1-2021 00:00:30 |
| 1   | p471       | 1-1-2021 00:00:00 |
| ... |            |                   |

| Checkpoint | Beschrijving           | Erasmus MC activiteiten |
|------------|------------------------|-------------------------|
| 1          | Aanmelden monster      | Besteld                 |
| 2          | Aankomst analysestraat | Aankomst c8000          |
| 3          |                        | Pipet c702              |
| 4          | Resultaat gegenereerd  | Resultaat               |

# Methode

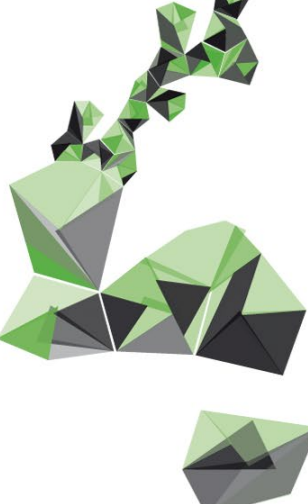
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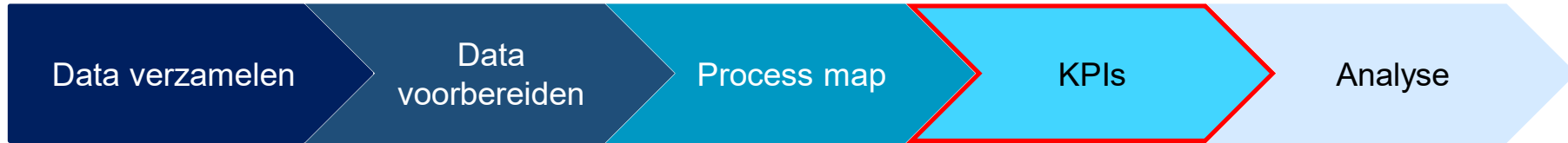
- Process mining: automatisch visualiseren gevolgde paden van lab monsters
- Disco: fuzzy miner
- Ongestructureerde processen
- Significantie- en correlatiestatistieken voor vereenvoudigen en visualiseren processen

- Günther CW, Van Der Aalst WMP. Fuzzy mining - Adaptive process simplification based on multi-perspective metrics. Int Conf Bus Proc Mang 2007:328-4
- Günther CW, Rozinat A. Disco: Discover your processes. BPM (Demos) 2012;940:40-4.





## Methode

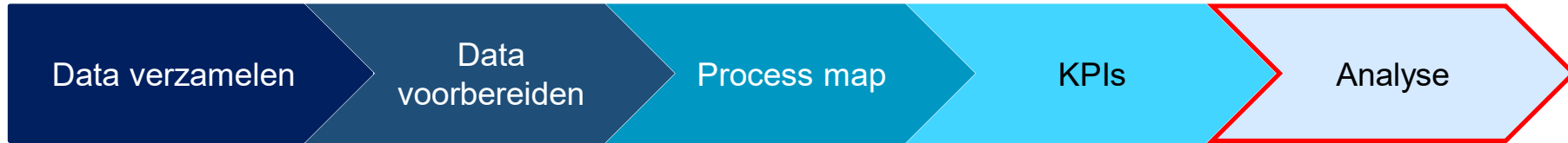


- 
- Doorlooptijd
  - Werklast (workload)
  - Machine uitval/onderhoud
  - Onderhanden werk (Work-in-process)



# Methode

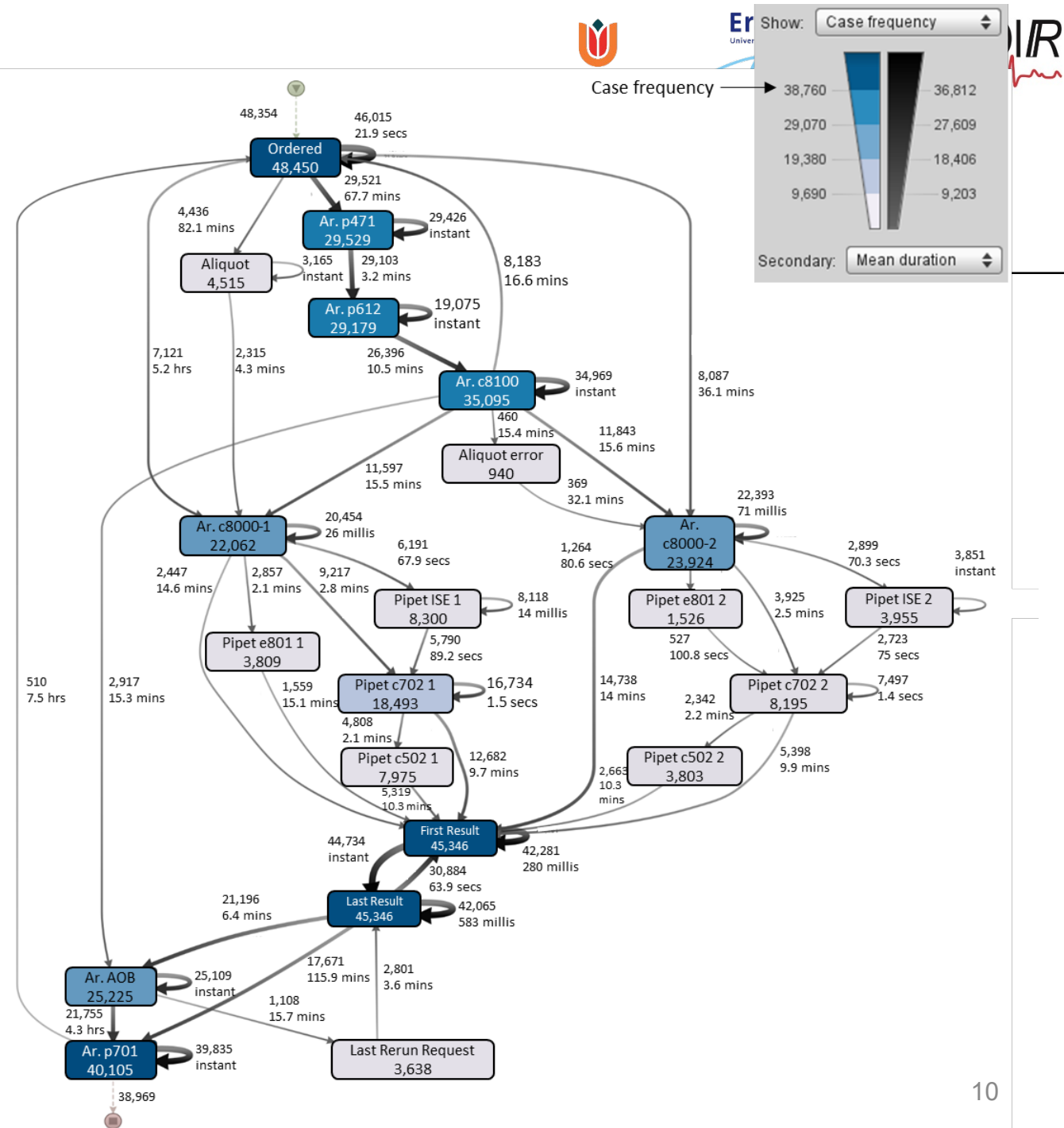
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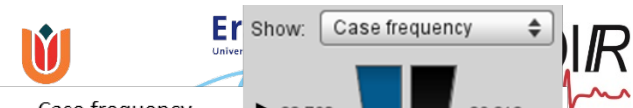


- Karakterisatie lab processen
- Verbeterpunten
- Alle monsters
- Monsters die doorlooptijd doelen niet halen

# Process map

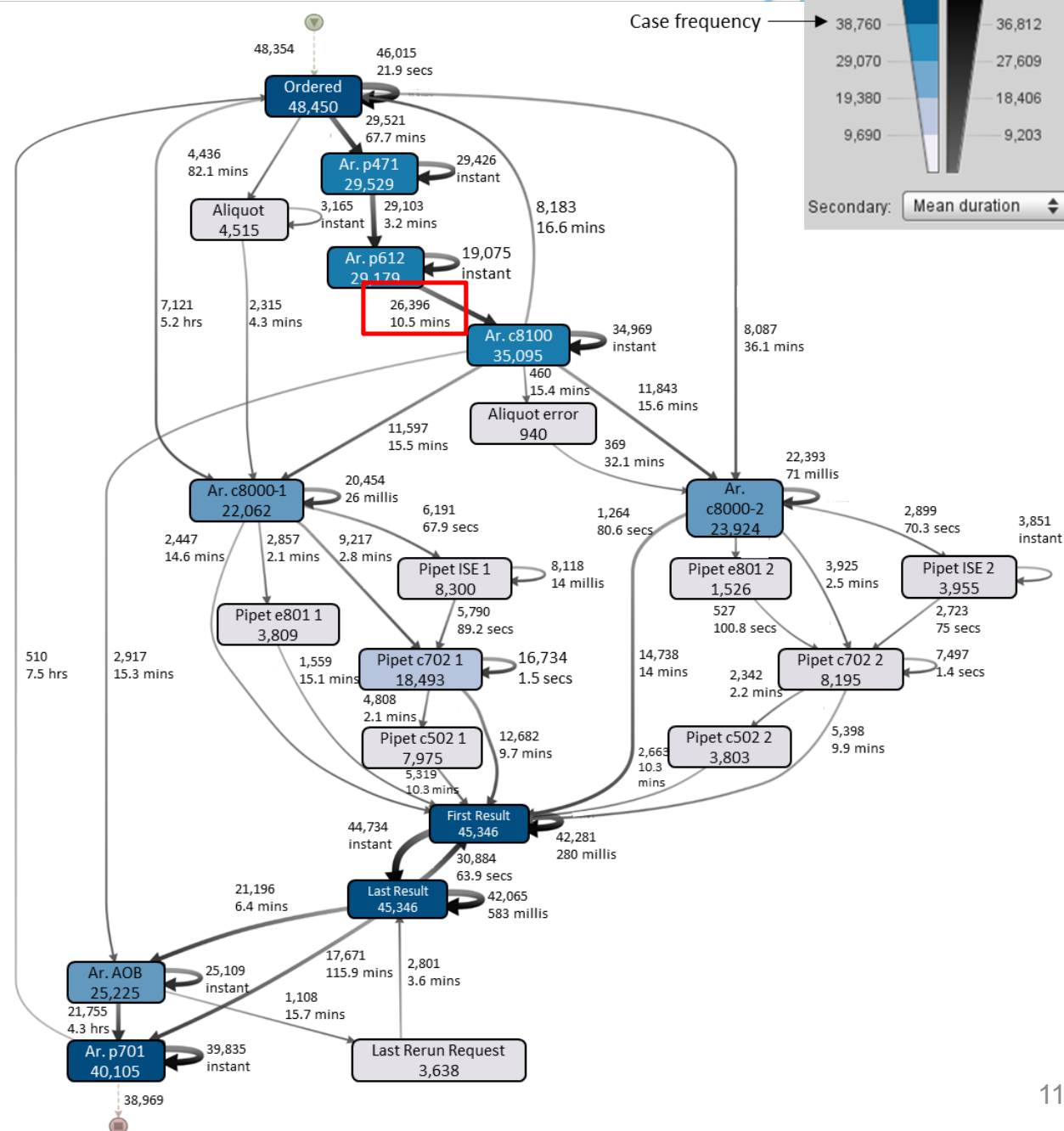
- Monster frequentie
- Gemiddelde duur
- Top 10% belangrijke paden
- Data: Januari 2019





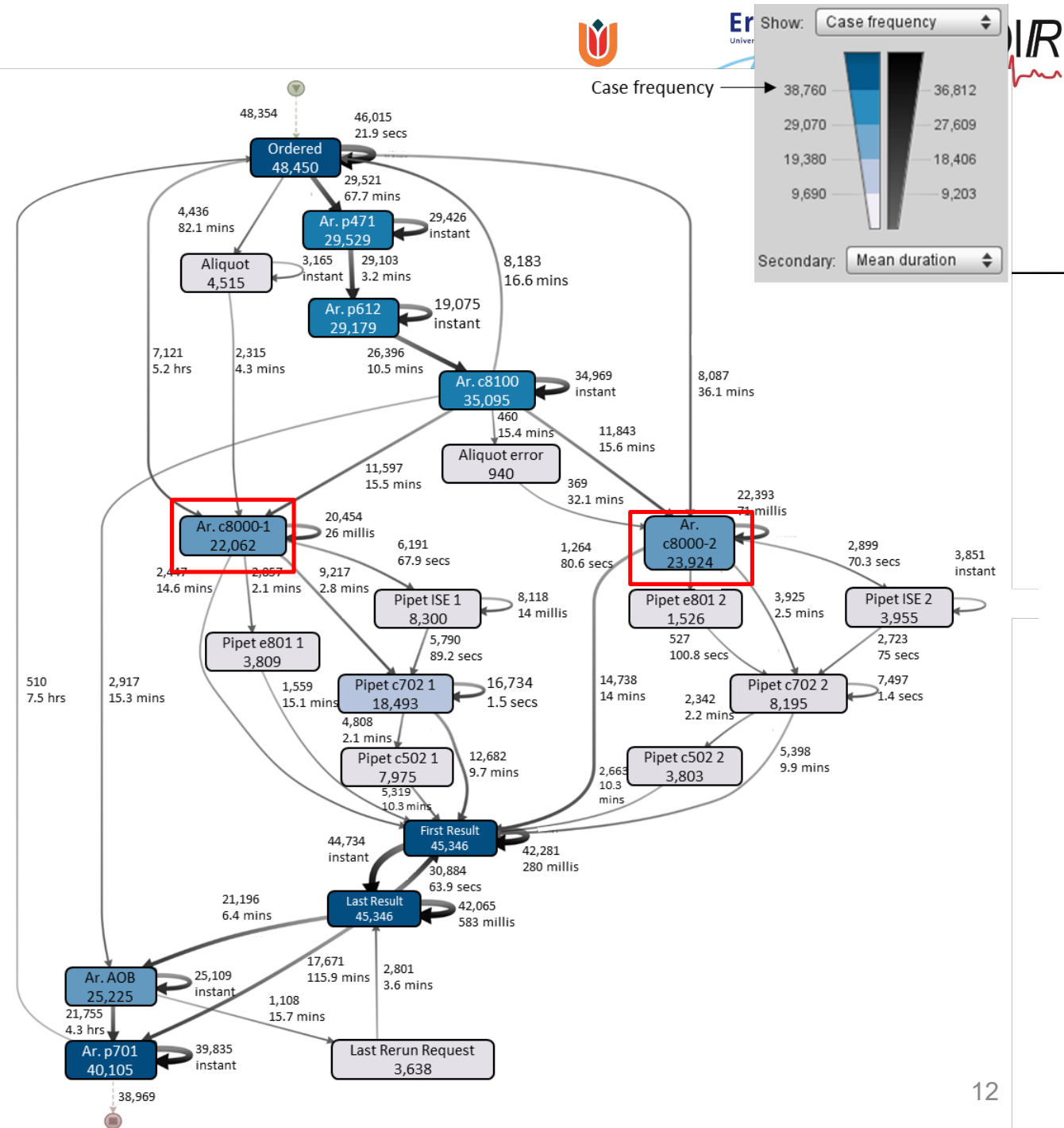
## An abstract illustration featuring a stylized plant on the left side, composed of numerous thin, flowing lines in yellow and black. Below the plant, several green, faceted, gem-like shapes are scattered across the page. One large, prominent faceted shape is located near the bottom center, while several smaller ones are positioned around it. A series of parallel, slightly curved lines in a light brown or tan color extends from the bottom left towards the center. The overall style is minimalist and modern, with a focus on geometric and organic forms.

- Monster frequentie
- Gemiddelde duur
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# Process map

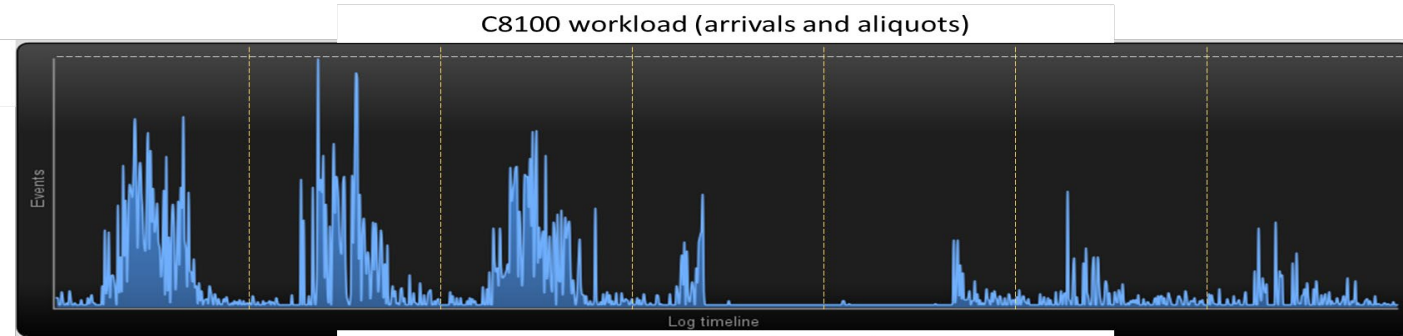
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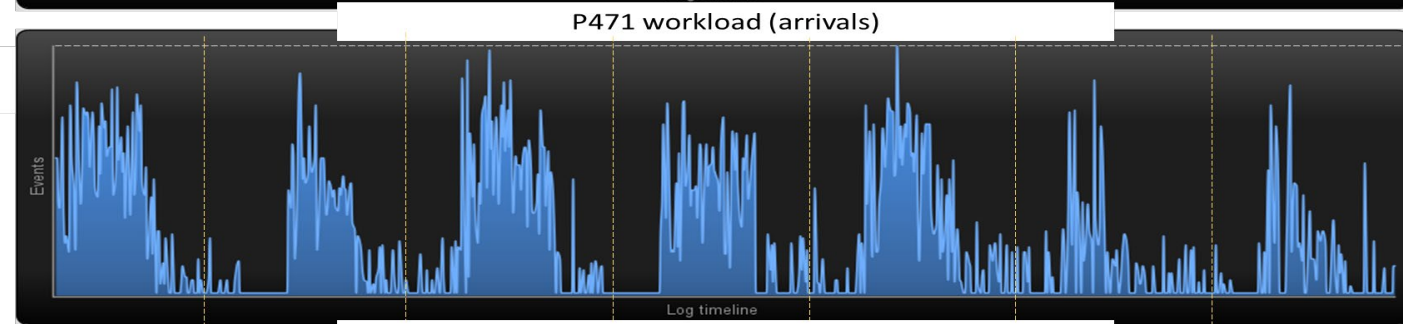
# Processen in de tijd

- Werklast (workload)
- Machine uitval/onderhoud
- Onderhanden werk (Work-in-process)

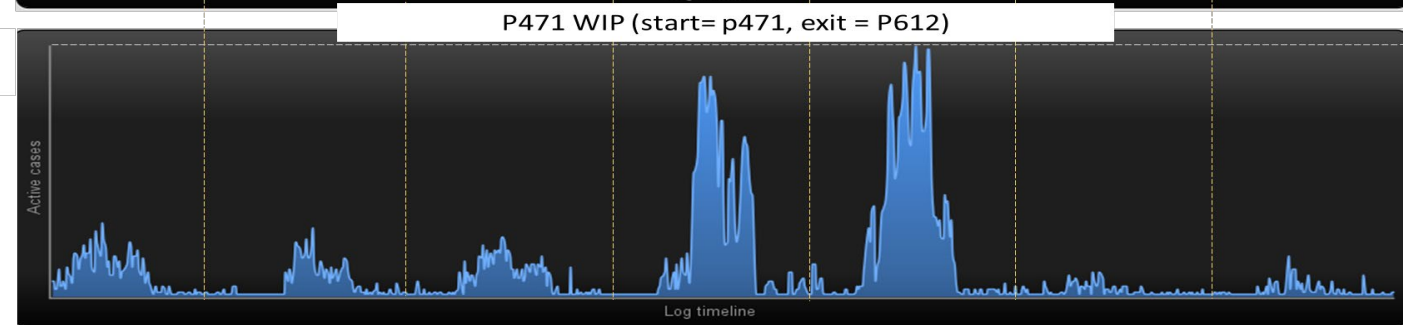
840 events/  
10 mins



108 events/  
min



90 active  
cases/min



Mon Jan 14    Tue Jan 15    Wed Jan 16    Thur Jan 17    Fri Jan 18    Sat Jan 19    Sun Jan 20

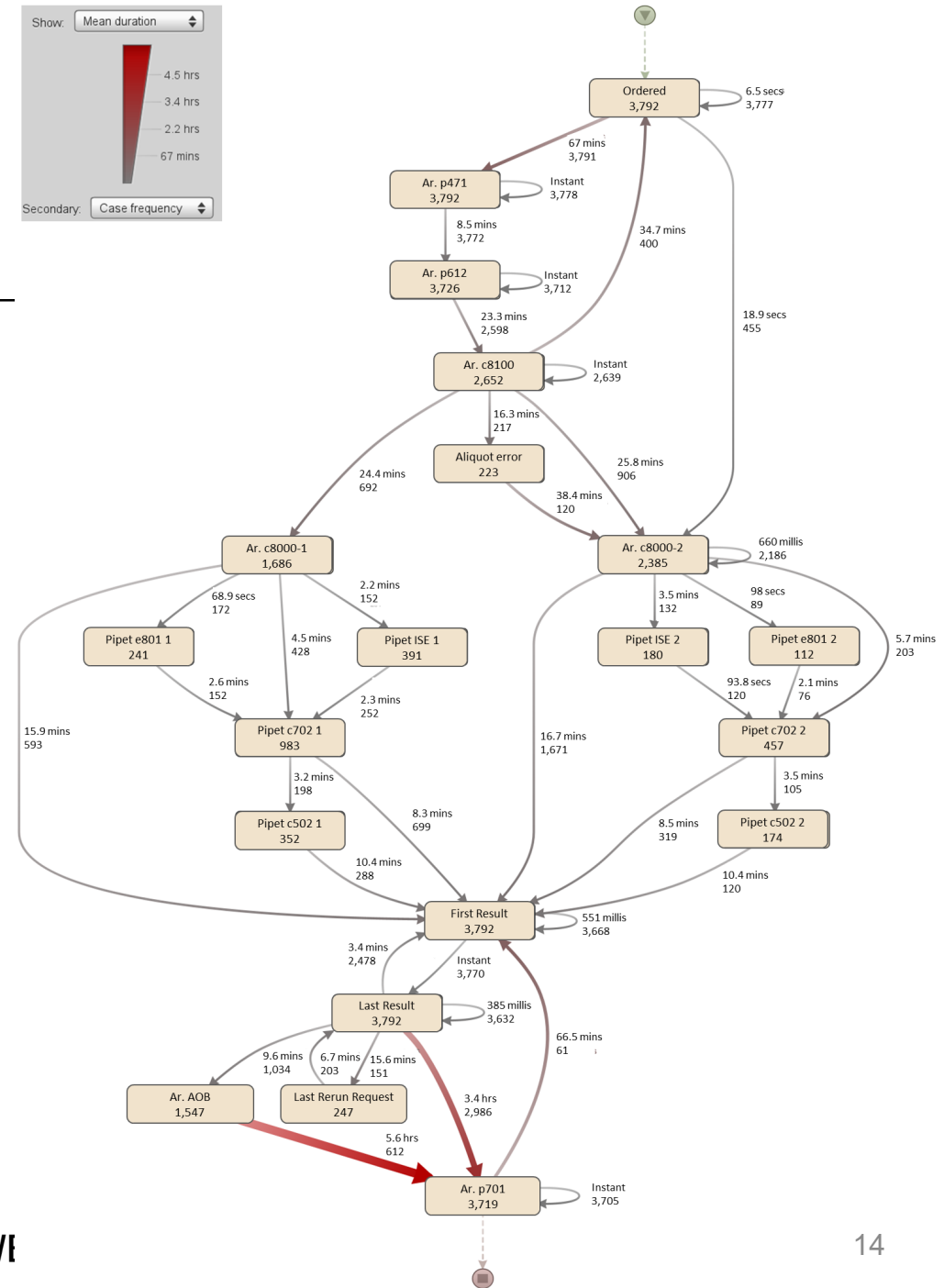
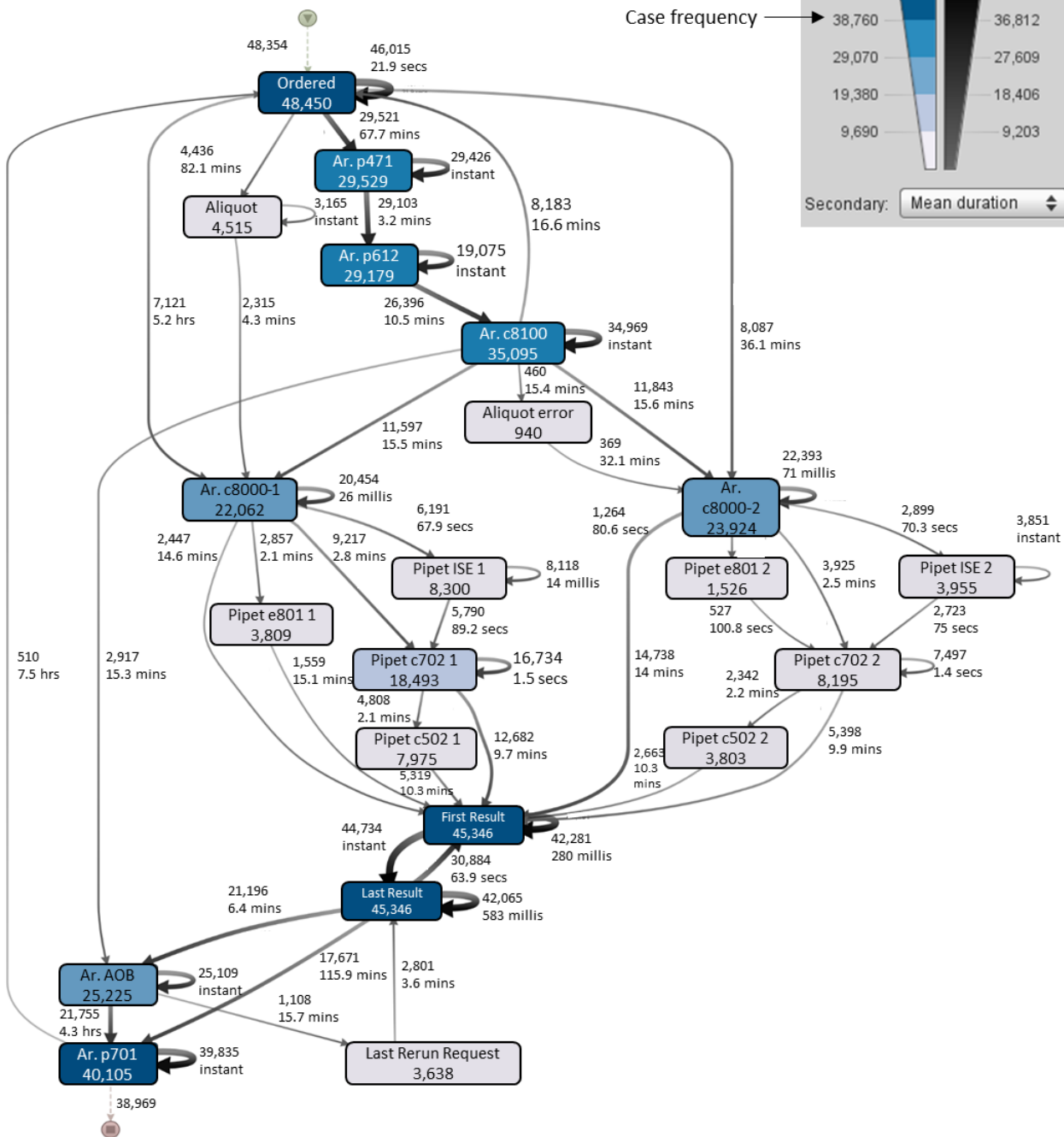
Pre-analyse

**p471**  
(back-up  
centrifuge)

**p612**  
(sorteer-  
der)

**c8100**  
(2x centrifuge,  
aliquot, ontdopper)

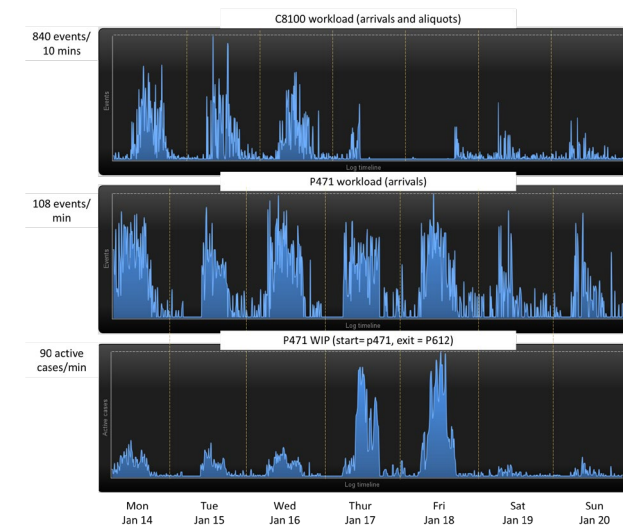
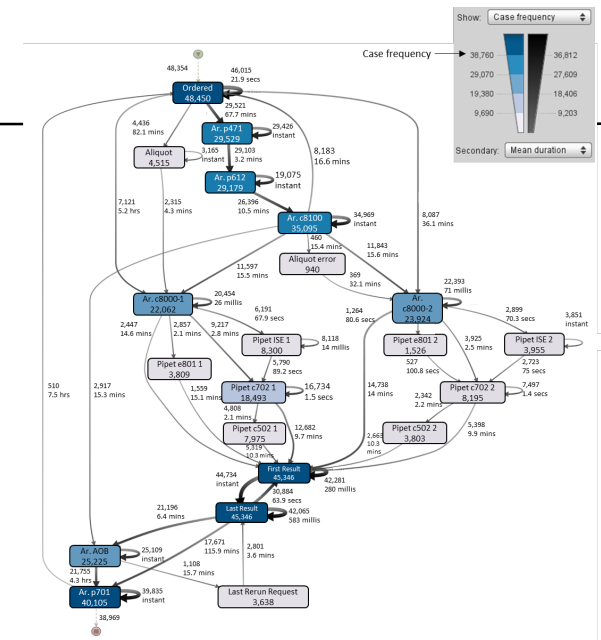




TY OF TWI

# Conclusie

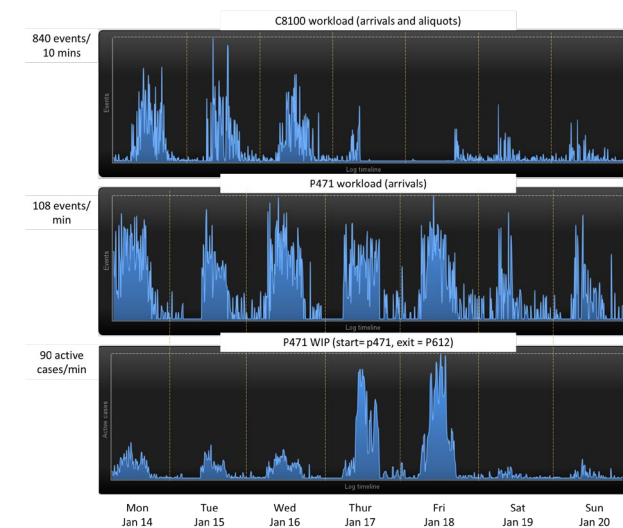
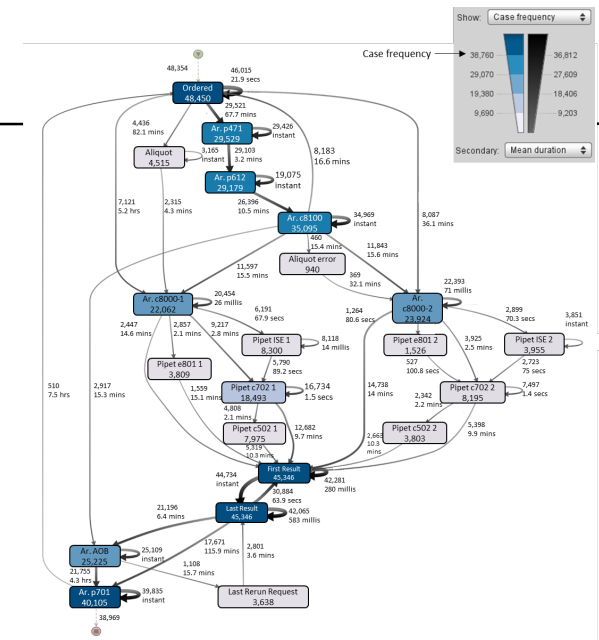
- Process mining, icm gebruik van relevante KPI's:
  - karakteriseren lab processen
  - identificeren verbeterpunten
  - ontdekken karakteristieken en bottlenecks van monsters die TAT doelen niet halen
  - motiveren vrijgeven en gebruik lab event data





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  - motiveren vrijgeven en gebruik lab event data
- Methode is breed toepasbaar in het lab
  - Andere subpopulaties: bijv. speedmonsters
  - Vergelijk prestatie lab voor en na interventies
- Methode is breed toepasbaar om zorgprocessen te karakteriseren



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