Customer Journeys and Process Mining – Challenges and Opportunities

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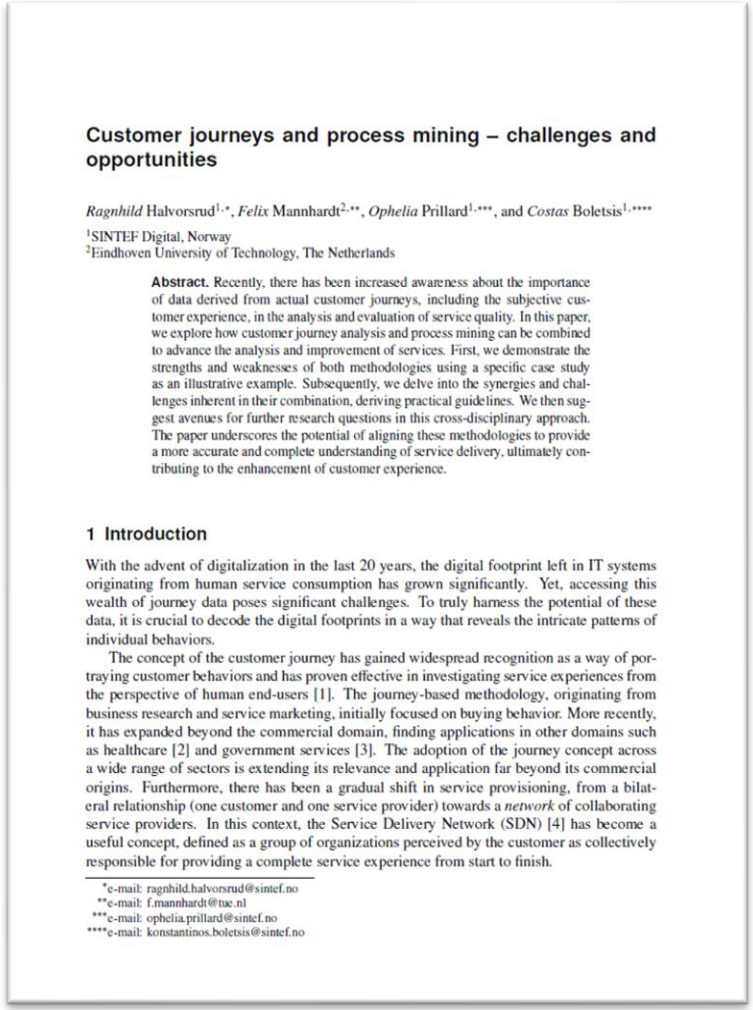
About the paper

- Co-authors
  - Felix Mannhardt — Eindhoven University of Technology
  - Ophelia Prillard — SINTEF Digital
  - Costas Boletsis — SINTEF Digital
- Research project
  - Smart Journey Mining: towards successful digitalisation of services www.smartjourneymining.no
  - Customer Journey Modeling Language: www.cjml.no
  - Funded by the Research Council of Norway (grant no. 312198)



Customer journeys and process mining – challenges and opportunities

Ragnhild Halvorsrud[1,*], *Felix* Mannhardt[2,**], *Ophelia* Prillard[1,***], and *Costas* Boletsis[1,****]

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Abstract. Recently, there has been increased awareness about the importance of data derived from actual customer journeys, including the subjective customer experience, in the analysis and evaluation of service quality. In this paper, we explore how customer journey analysis and process mining can be combined to advance the analysis and improvement of services. First, we demonstrate the strengths and weaknesses of both methodologies using a specific case study as an illustrative example. Subsequently, we delve into the synergies and challenges inherent in their combination, deriving practical guidelines. We then suggest avenues for further research questions in this cross-disciplinary approach. The paper underscores the potential of aligning these methodologies to provide a more accurate and complete understanding of service delivery, ultimately contributing to the enhancement of customer experience.

1 Introduction

With the advent of digitalization in the last 20 years, the digital footprint left in IT systems originating from human service consumption has grown significantly. Yet, accessing this wealth of journey data poses significant challenges. To truly harness the potential of these data, it is crucial to decode the digital footprints in a way that reveals the intricate patterns of individual behaviors.

The concept of the customer journey has gained widespread recognition as a way of portraying customer behaviors and has proven effective in investigating service experiences from the perspective of human end-users [1]. The journey-based methodology, originating from business research and service marketing, initially focused on buying behavior. More recently, it has expanded beyond the commercial domain, finding applications in other domains such as healthcare [2] and government services [3]. The adoption of the journey concept across a wide range of sectors is extending its relevance and application far beyond its commercial origins. Furthermore, there has been a gradual shift in service provisioning, from a bilateral relationship (one customer and one service provider) towards a *network* of collaborating service providers. In this context, the Service Delivery Network (SDN) [4] has become a useful concept, defined as a group of organizations perceived by the customer as collectively responsible for providing a complete service experience from start to finish.

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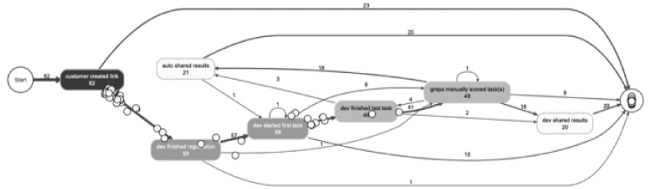
Smart Journey Mining

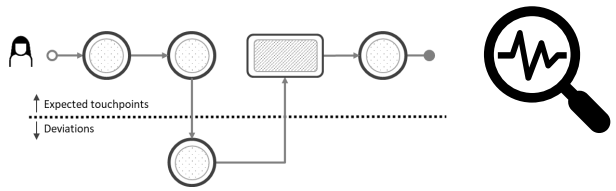
Customer journeys

Process mining



Customer journey modelling language

Customer journey analysis

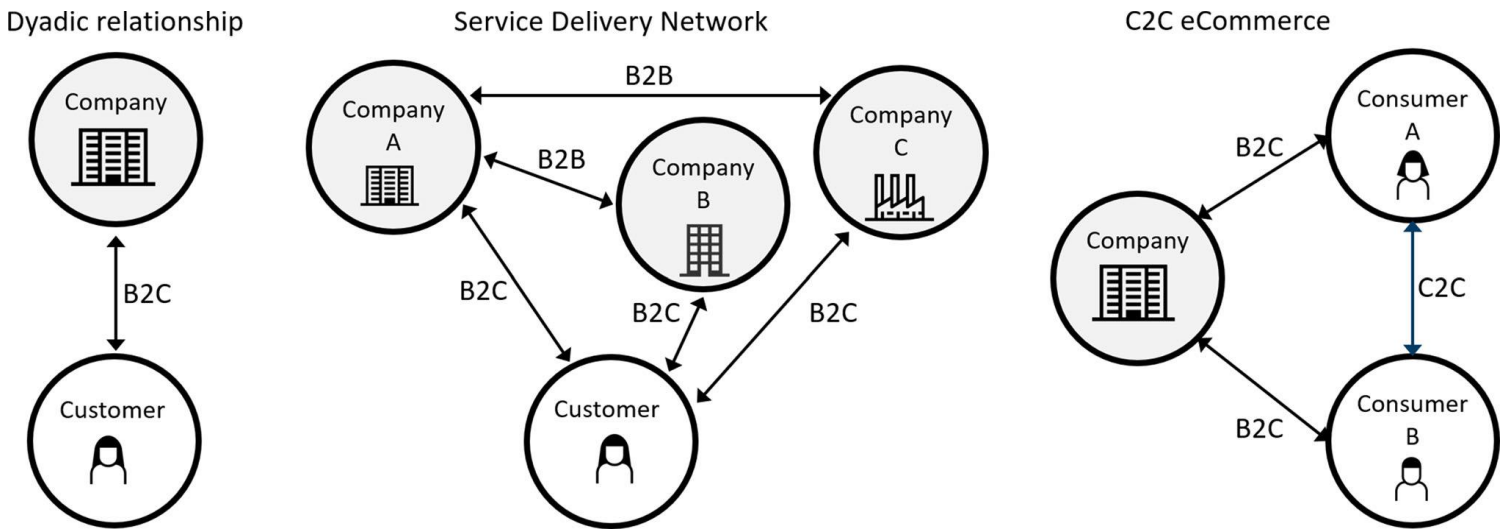


Customer experience

Research question: What are the strengths and weaknesses of Customer Journey Analysis (CJA) and Process Mining (PM) in capturing actual customer journeys and the associated customer experience?

Challenges and opportunities

The service landscape



Traditional

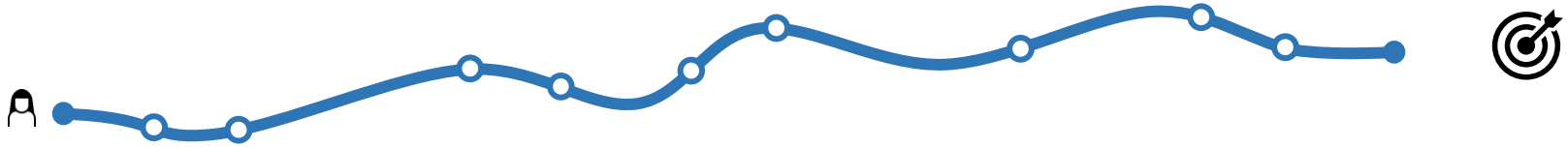
Online store

AirBnB

Service Delivery Network (SDN): "Two or more organizations that, in the eyes of the customer, are responsible for the provision of a connected overall service experience."

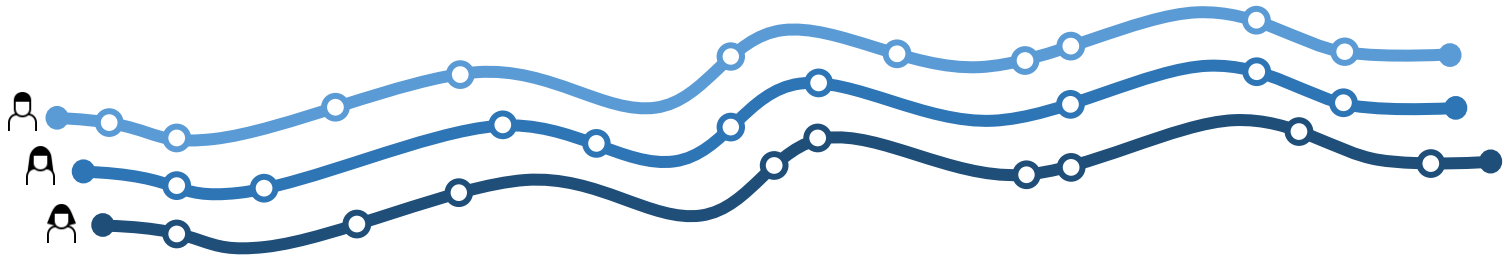
Tax, S. S., McCutcheon, D., & Wilkinson, I. F. (2013). The service delivery network (SDN) a customer-centric perspective of the customer journey. Journal of service research, 16(4), 454-470.

Customer journeys



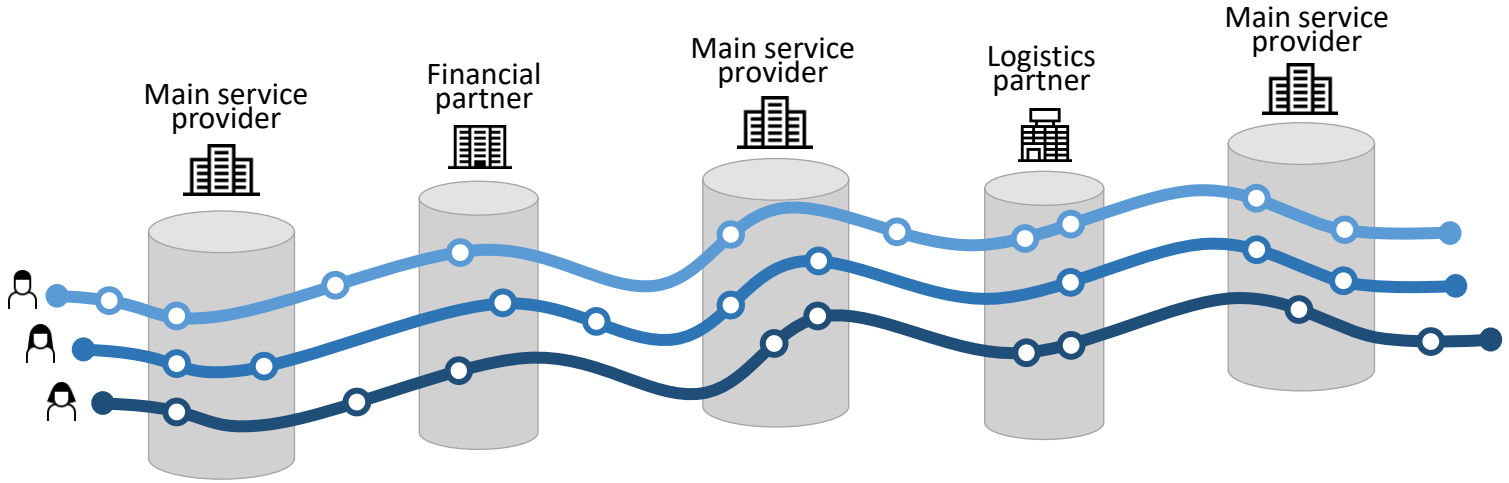
- A customer journey may last for days, weeks or even months

Customer journeys



- A customer journey may last for days, weeks or even months
- For a given service, customer journeys may differ

Customer journeys



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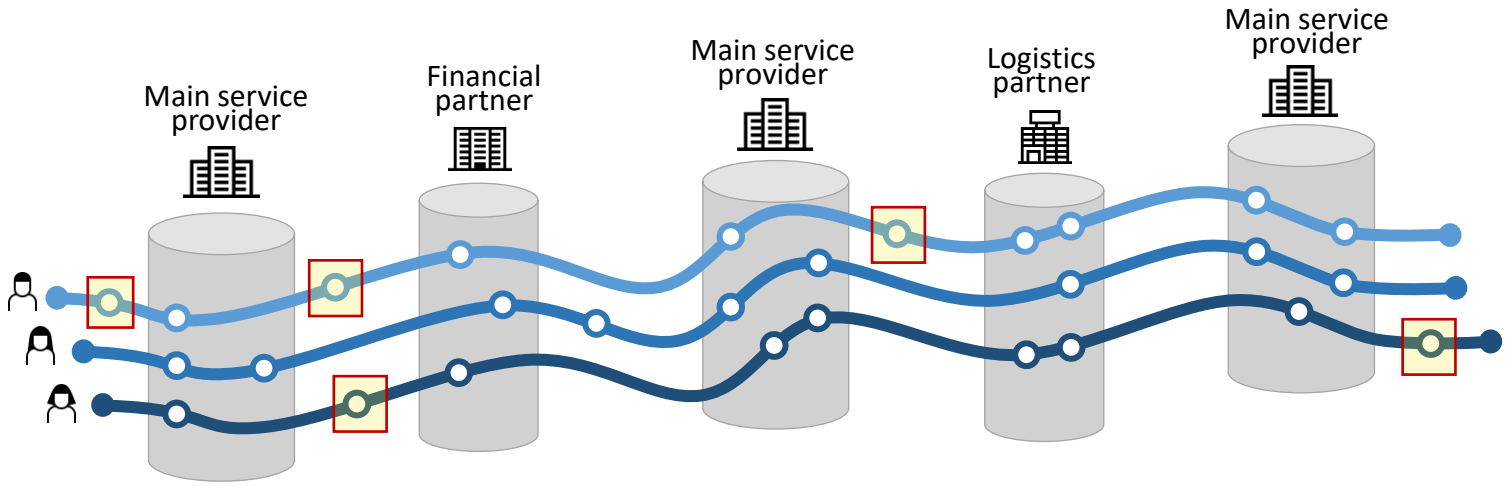
- Most touchpoints leave a digital trace in the Service Delivery Network

Customer journeys



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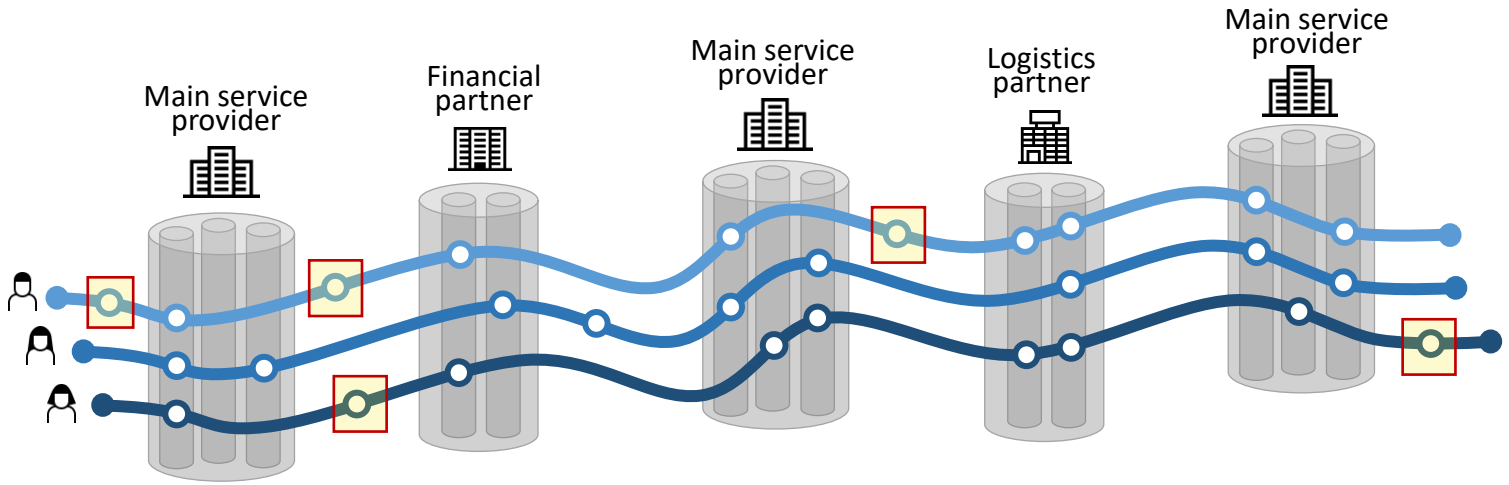
Customer journeys



- A customer journey may last for days, weeks or even months
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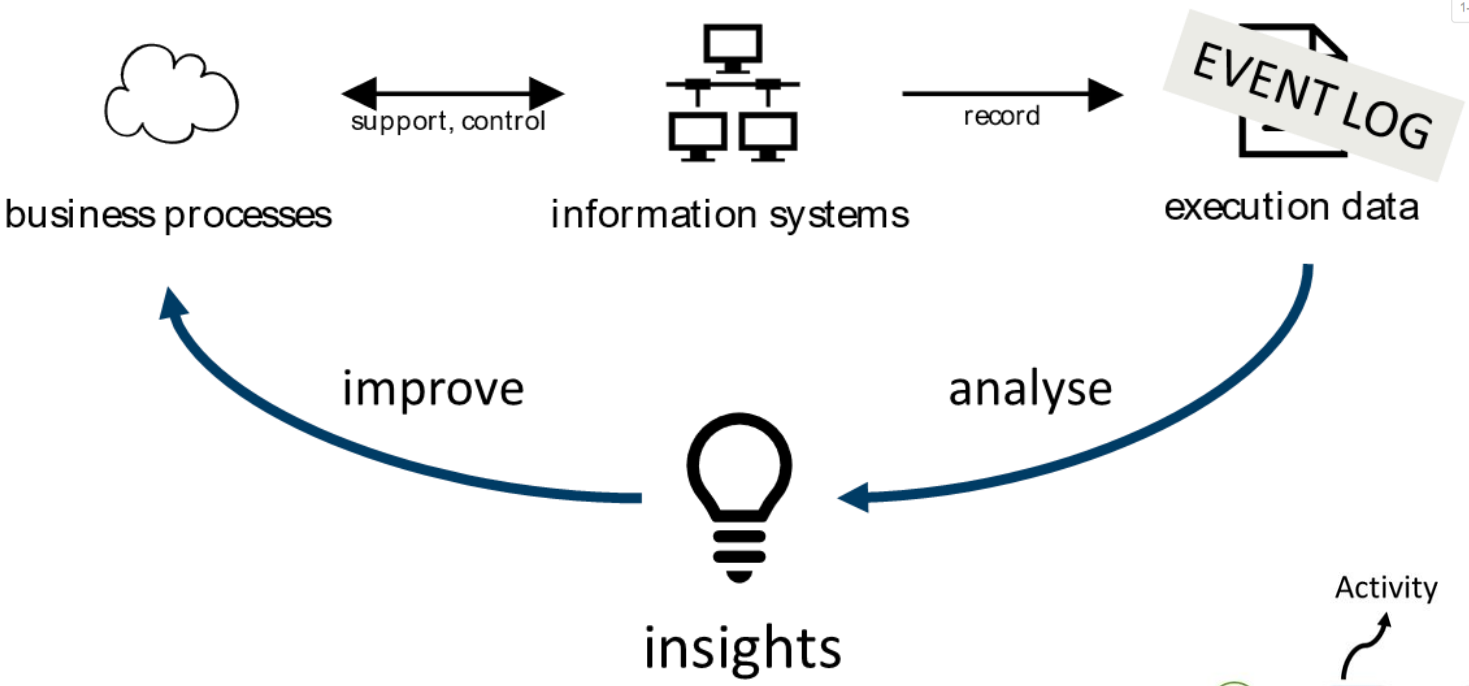
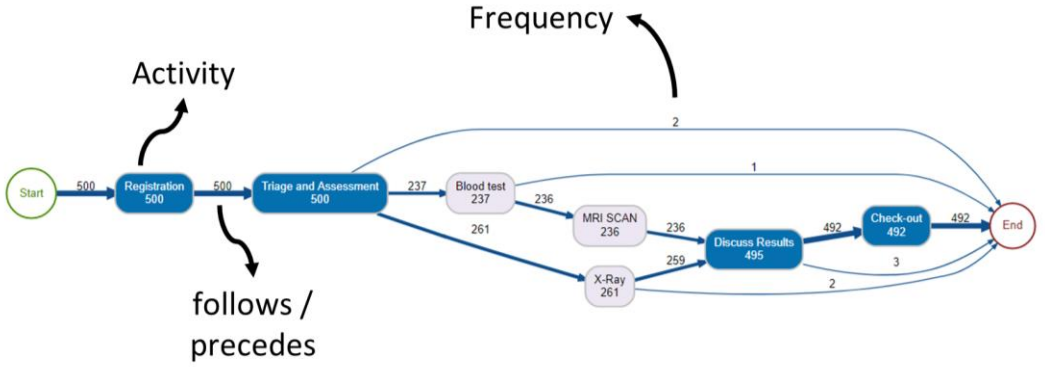
- Not all touchpoints are traceable
- A customer journey often intersects multiple IT systems in a company

Process Mining

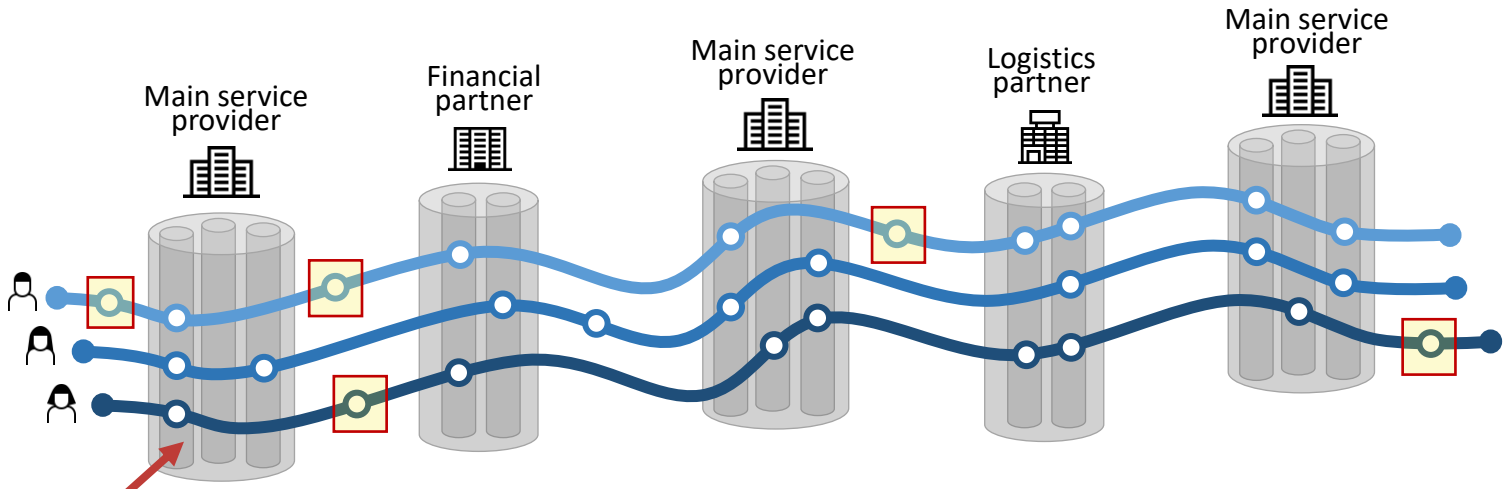
handling <fctr>	patient <chr>	employee <fctr>	handling_id <chr>	registration_type <fctr>	time <S3: POSIXct>	.order <int>
Registration	1	r1	1	start	2017-01-02 11:41:53	1
Registration	2	r1	2	start	2017-01-02 11:41:53	2
Triage and Assessment	1	r2	501	start	2017-01-02 12:40:20	501
Registration	1	r1	1	complete	2017-01-02 12:40:20	2722
Registration	2	r1	2	complete	2017-01-02 15:16:38	2723
Triage and Assessment	2	r2	502	start	2017-01-02 22:32:25	502
Triage and Assessment	1	r2	501	complete	2017-01-02 22:32:25	3222
Triage and Assessment	2	r2	502	complete	2017-01-03 12:34:01	3223
Registration	4	r1	4	start	2017-01-04 01:34:04	4
Registration	3	r1	3	start	2017-01-04 01:34:05	3

1-10 of 5,442 rows Previous 1 2 3 4 5 6 … 545 Next





Customer journeys



Process mining often focus on a single business process

- A customer journey may last for days, weeks or even months
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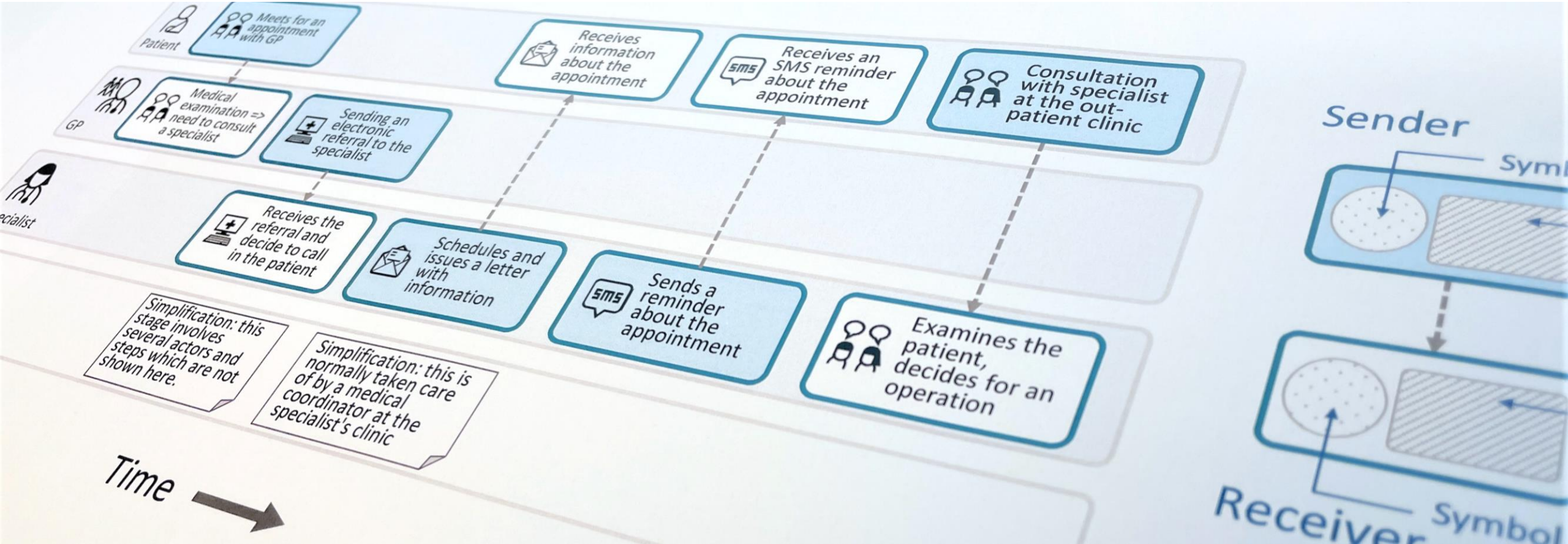
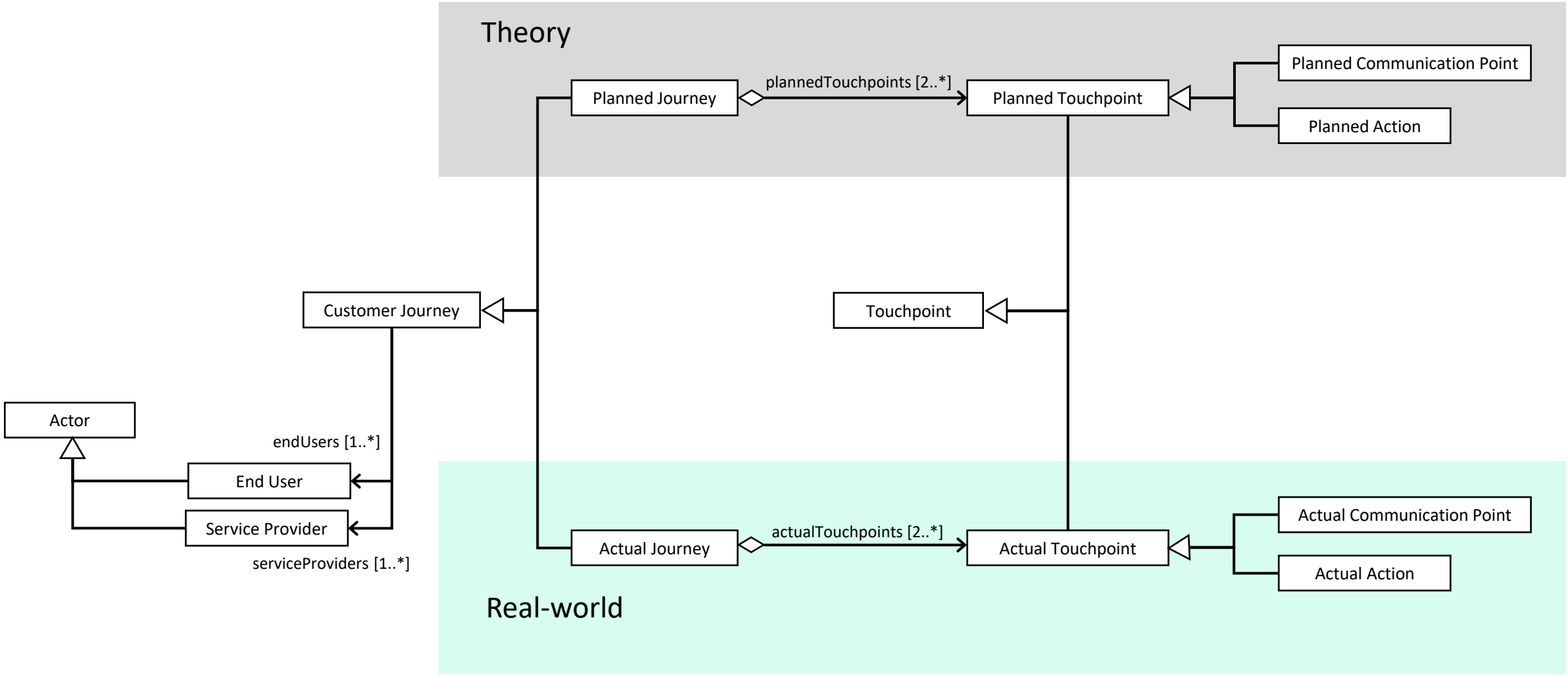
CJML - Customer Journey Modeling Language

CJML is a visual language dedicated to modeling of customer journeys, human behaviour and digital service processes

Customer journey | User journey | Employee journey | Patient journey | Citizen journey



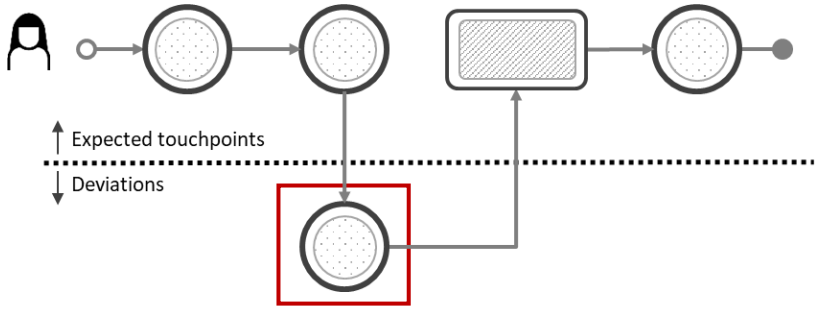
CJML simplified metamodel



Two diagram types

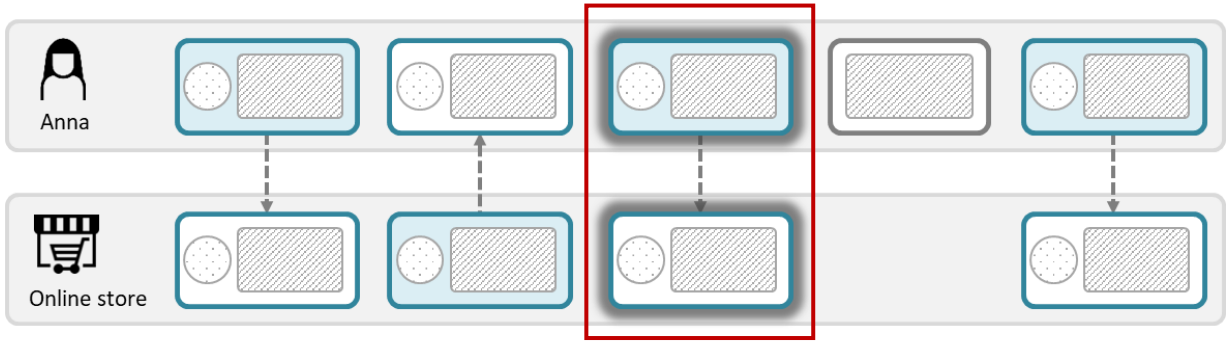
Customer journey diagram

- Suitable when focusing only on the end-user
- Suitable when few actors are involved
- Suitable when **emphasizing deviations** from the planned journey



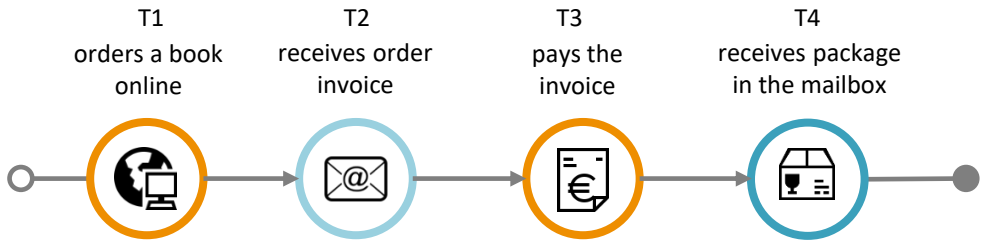
Journey network diagram ("swimlane diagram")

- Suitable when several actors are involved
- **Reveals both the sender and the receiver** of a communication point
- Emphasizes the direction of the message flow



Example – online bookstore

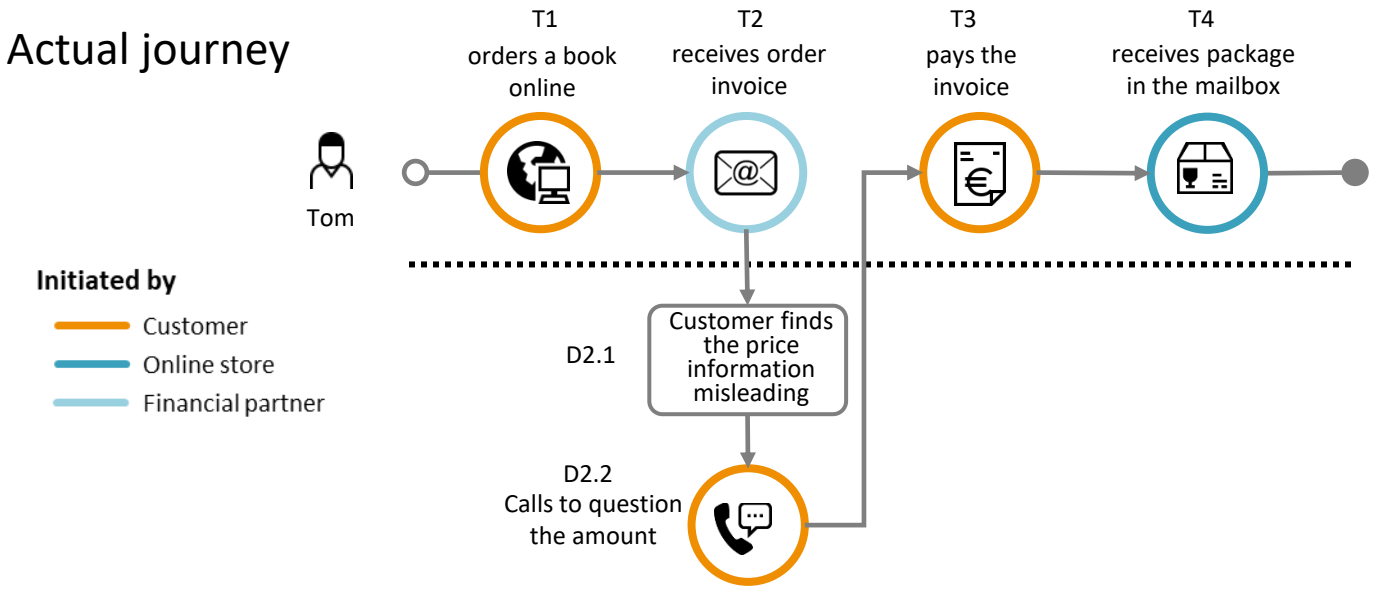
Planned journey



Initiated by

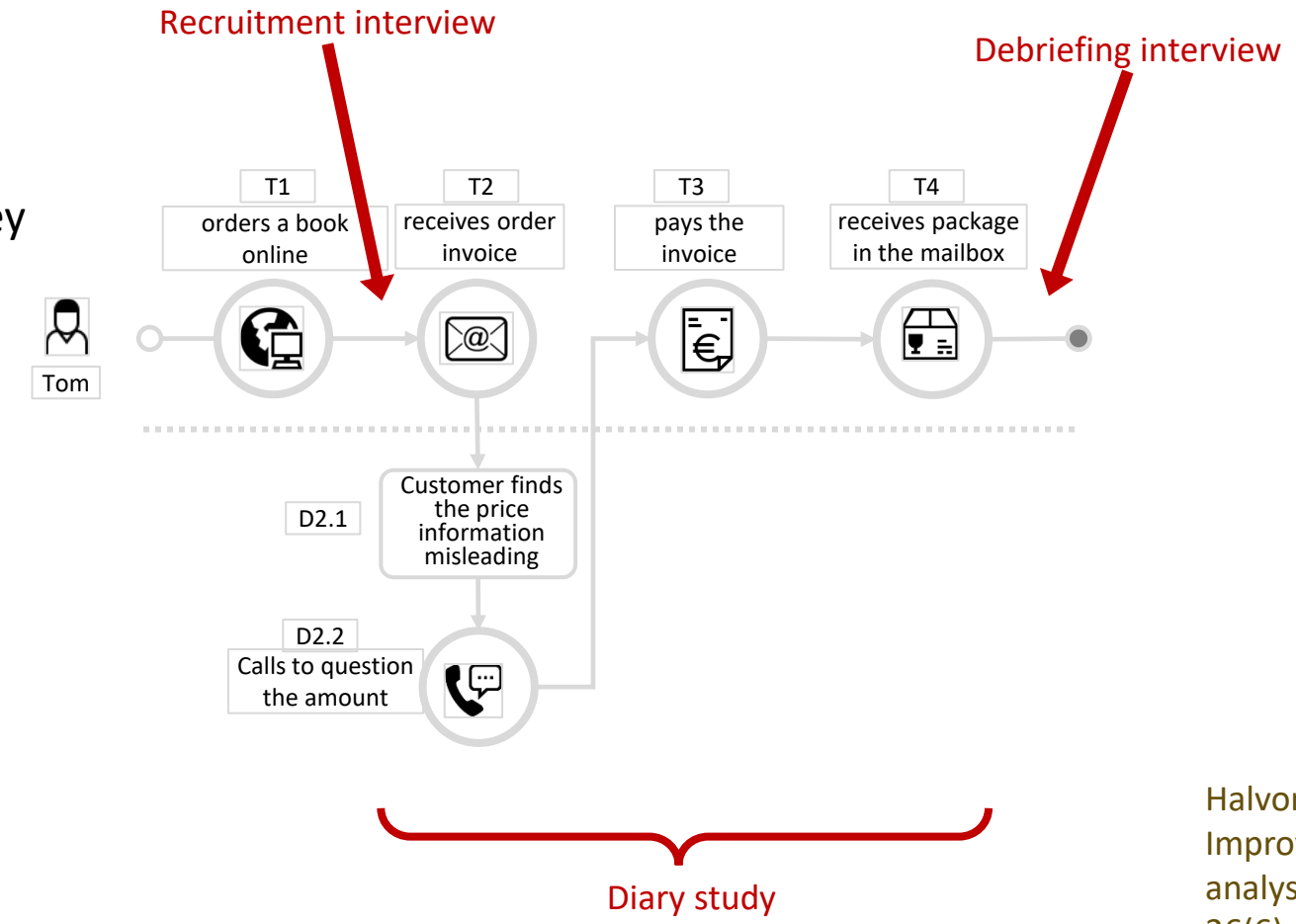
- Customer
- Online store
- Financial partner

Example – online bookstore



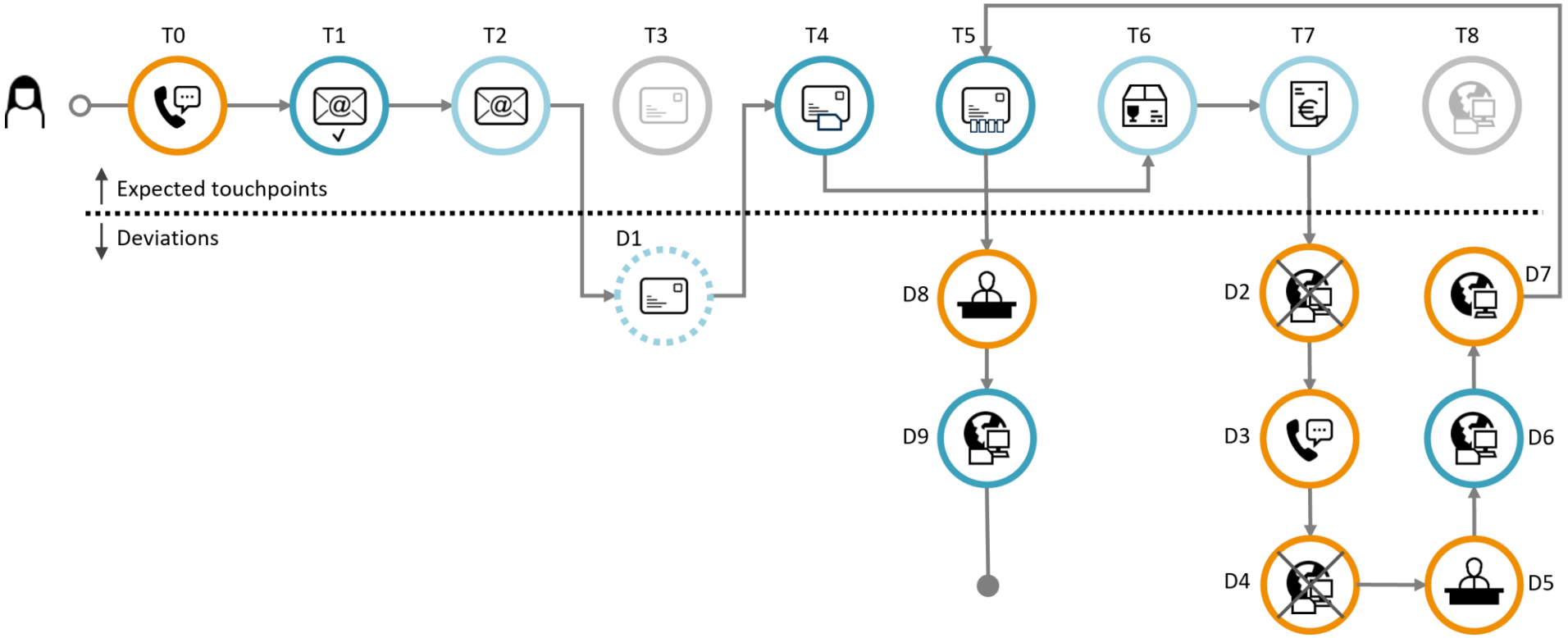
Customer Journey Analysis

Actual journey



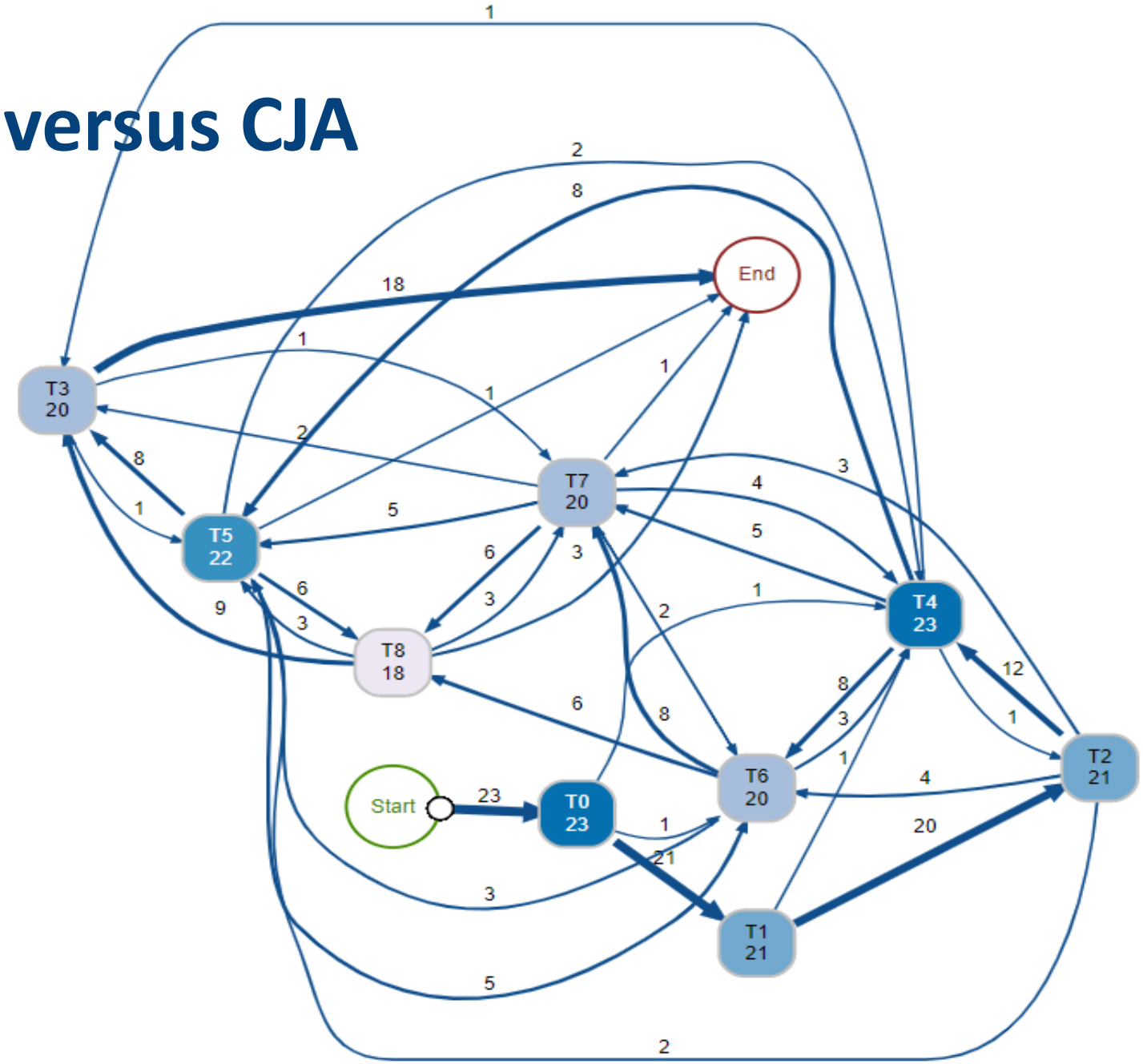
Halvorsrud, R., Kvale, K., & Følstad, A. (2016). Improving service quality through customer journey analysis. Journal of service theory and practice, 26(6), 840-867

Case study: onboarding journey



Process mining versus CJA

- Automatically created, but relies on detectable touchpoints
- Limited information about initiator, channel etc
- Aggregated view of all the actual journeys (n=23)
- Numbers and arrow thickness indicate frequencies

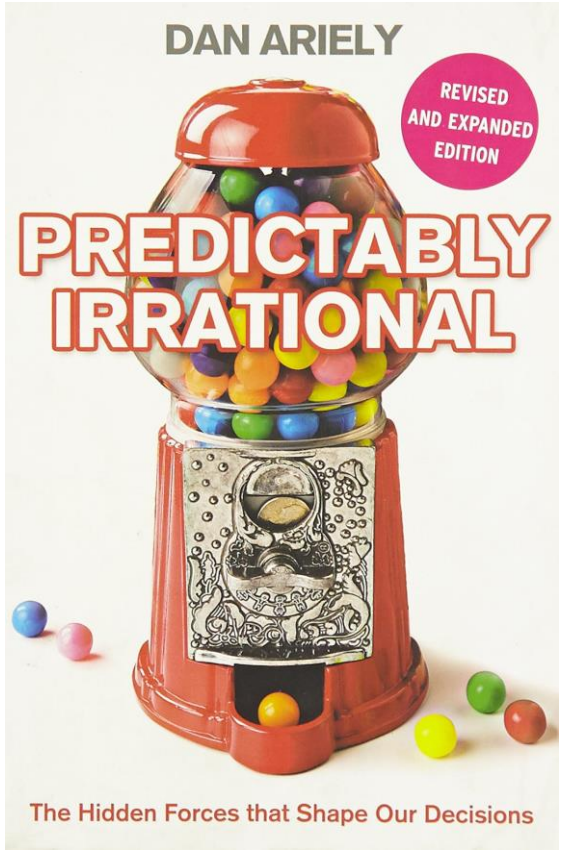


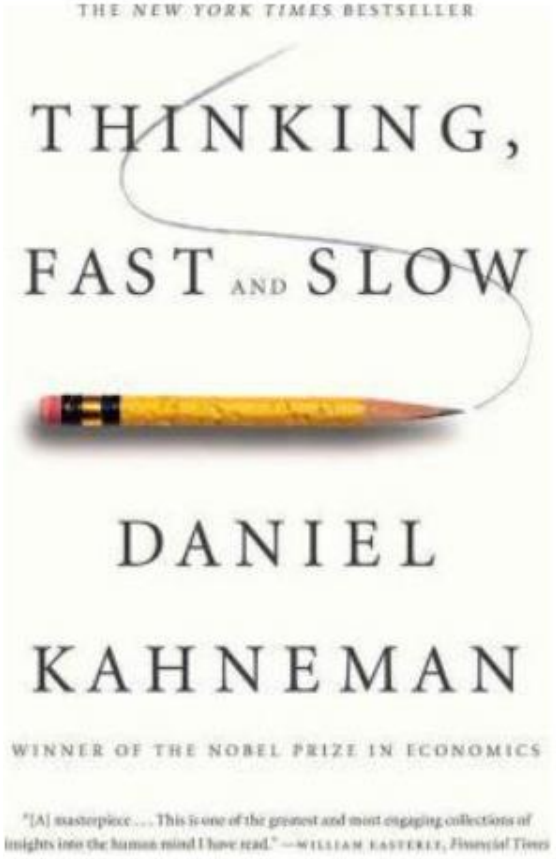
Challenges – process mining

- Capturing the end-to-end journey
- Organizational borders in the service delivery network
- Non-detectable touchpoints
- Capturing the customer experience

Researching experience

When researching human experiences, we "disturb" the system.





Comparison

	Customer journey analysis	Process mining
Perspective	(+) human-centered	(-) process-centred
Mode of operation	(-) manual	(+) automated
Scalability	(-) small samples	(+) full population
Validity, planned journeys	(+) high	NA
Validity, actual journeys	(+) high (biased by perception)	(+) high (biased by data)
Customer experience	(+) qualitative (precise, rich, and actionable)	(-) quantitative (generic, not actionable)

Conclusion and future work

- Recommendation
  - Pre-analysis: Apply CJA to a small sample
  - Use the pre-analysis to inform the process mining approach
- The importance of data derived from customer journeys
- Reveal patterns of deviations in customer journeys
- Need guidelines for customer-centric design of the SDN
- Establish the relation between events and touchpoints

"Man is a slow, sloppy and brilliant thinker;
the machine is fast, accurate and stupid."

William M. Kelly

Feedback or questions?

- Contact
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