

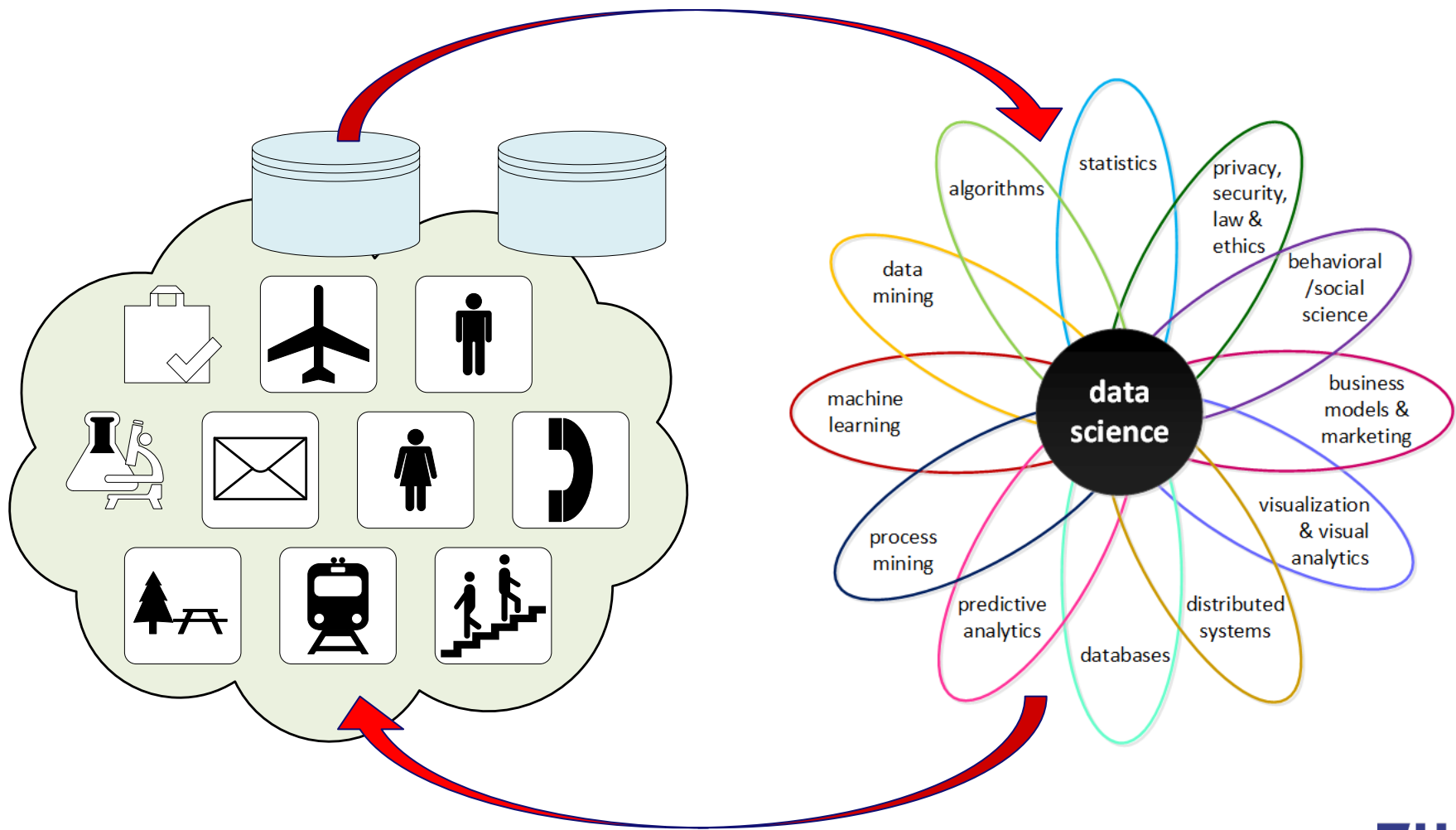
Process Mining Spreadsheet-Like Technology for Processes!

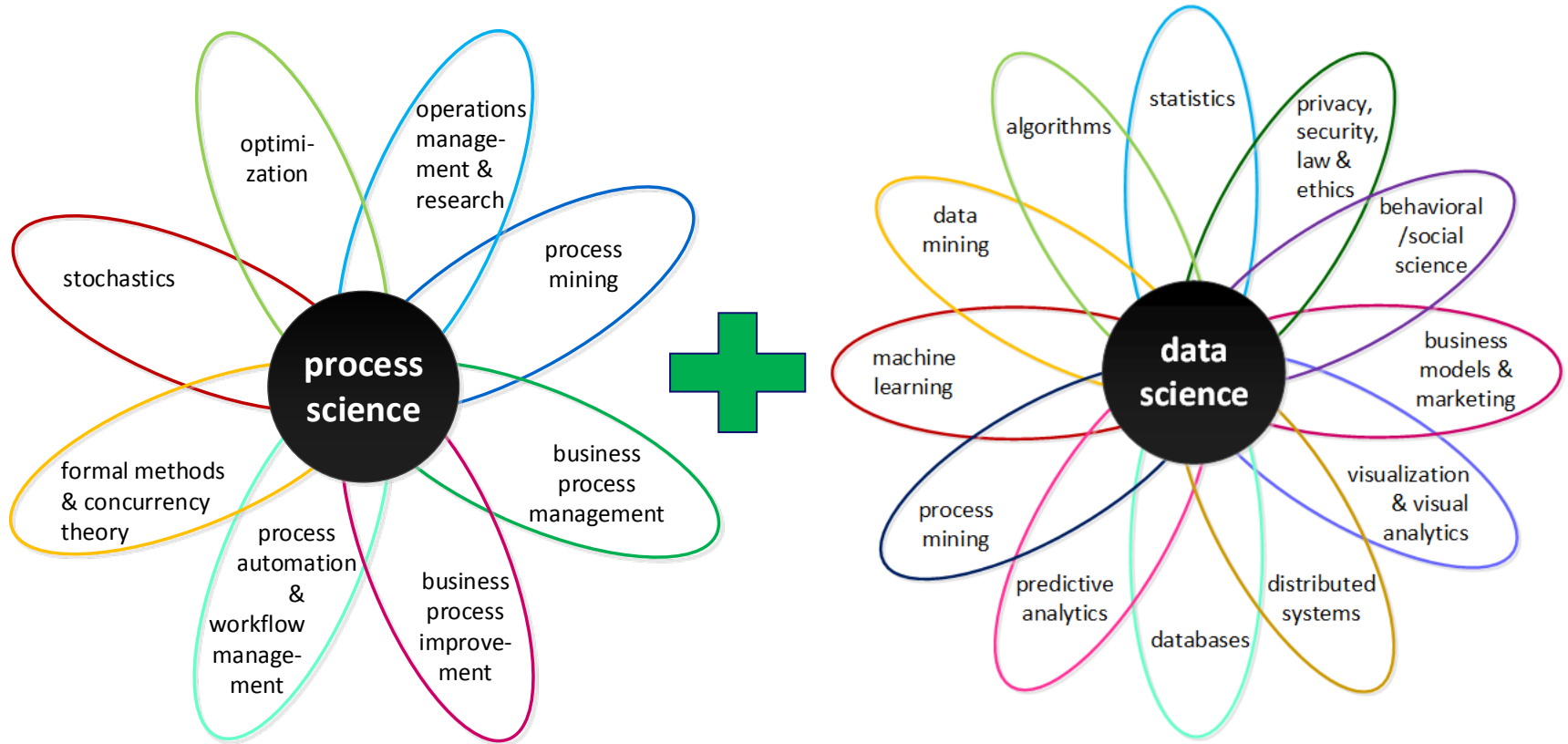
Wil van der Aalst

www.vdaalst.com @wvdaalst

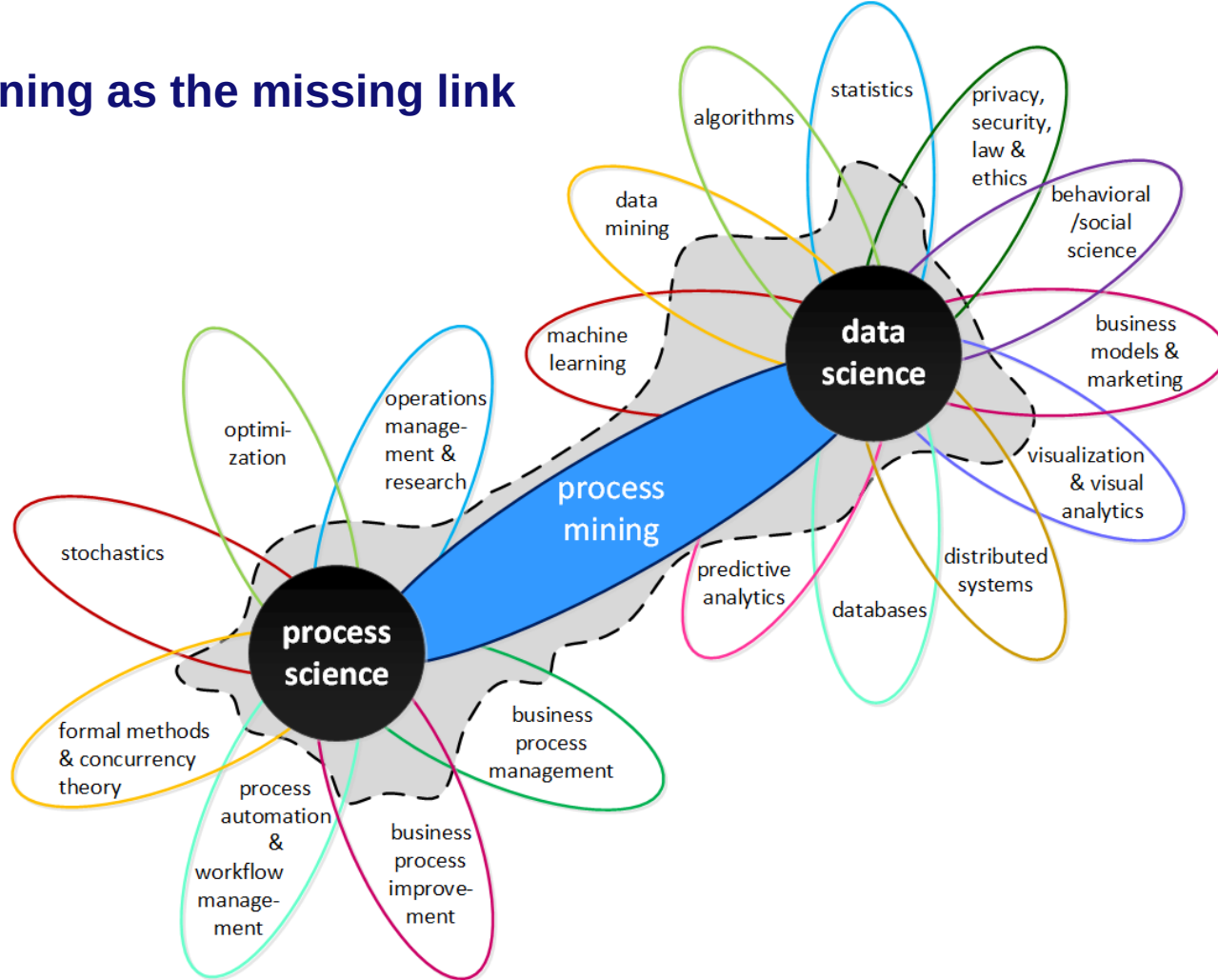
www.processmining.org







process mining as the missing link



Process Mining: On the interface between process science and data science



Spreadsheet: Killer App for early computers

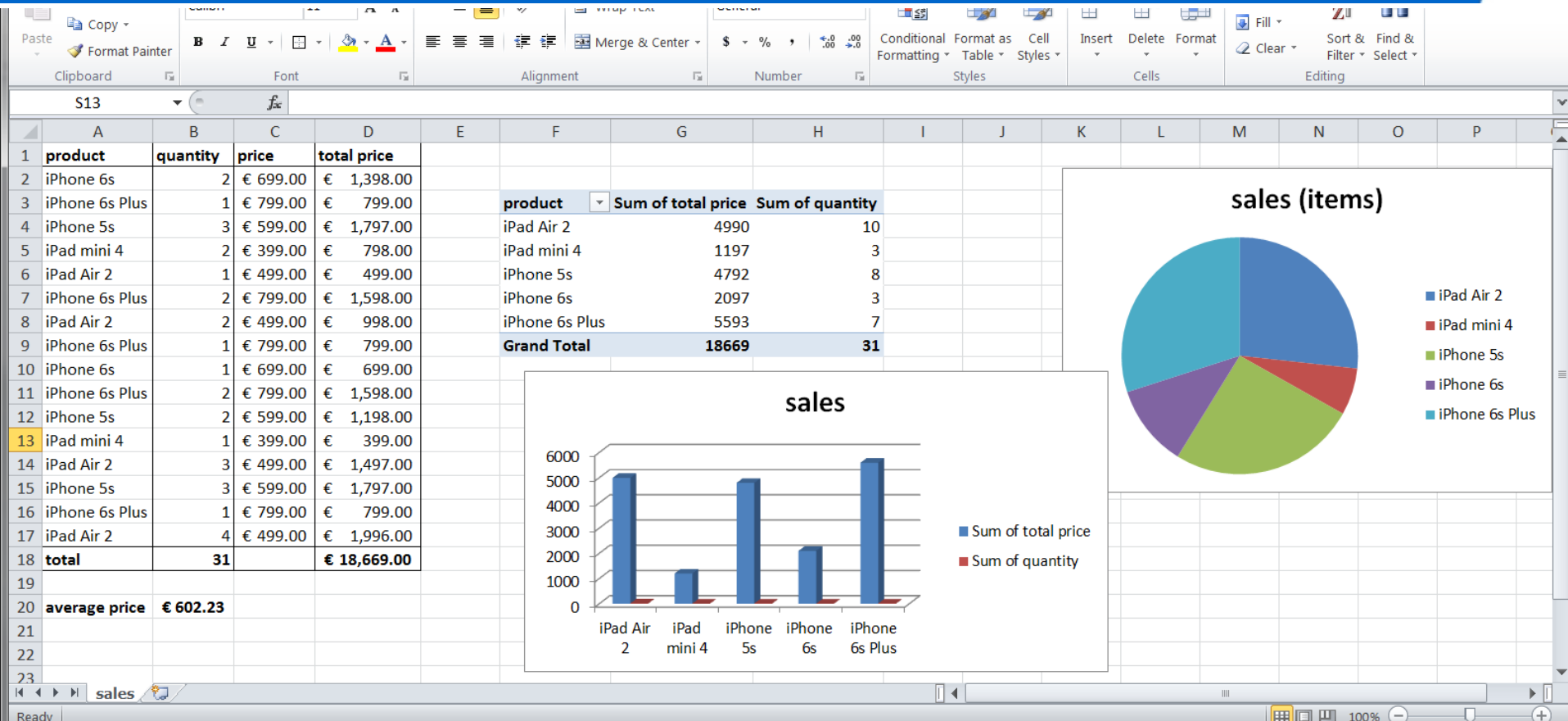
C11 (L) TOTAL C1
25

	A	B	C	D
1	ITEM	NO.	UNIT	COST
2	MUCK RAKE	43	12.95	556.85
3	BUZZ CUT	15	6.75	101.25
4	TOE TONER	250	49.95	12487.50
5	EYE SNUFF	2	4.95	9.90
			SUBTOTAL	13155.50
			9.75% TAX	1282.66
			TOTAL	14438.16

- **VisiCalc** (killer app for Apple II, Oct. 1979)
- **Lotus 1-2-3** (killer app for IBM PC 1983)
- **Microsoft Excel** (1985)



Spreadsheet: Static data



Spreadsheet: Static data

The screenshot shows a spreadsheet with a table of Apple products. The table has columns for product, quantity, price, and total price. The data is as follows:

product	quantity	price	total price
iPhone 6s	2	€ 699.00	€ 1,398.00
iPhone 6s Plus	1	€ 799.00	€ 799.00
iPhone 5s	3	€ 599.00	€ 1,797.00
iPad mini 4	2	€ 399.00	€ 798.00
iPad Air 2	1	€ 499.00	€ 499.00
iPhone 6s Plus	2	€ 799.00	€ 1,598.00
iPad Air 2	2	€ 499.00	€ 998.00
iPhone 6s Plus	1	€ 799.00	€ 799.00
iPhone 6s	1	€ 699.00	€ 699.00
iPhone 6s Plus	2	€ 799.00	€ 1,598.00
iPhone 5s	2	€ 599.00	€ 1,198.00
iPad mini 4	1	€ 399.00	€ 399.00
iPad Air 2	3	€ 499.00	€ 1,497.00
iPhone 5s	3	€ 599.00	€ 1,797.00
iPhone 6s Plus	1	€ 799.00	€ 799.00
iPad Air 2	4	€ 499.00	€ 1,996.00
total	31		€ 18,669.00
average price	€ 602.23		

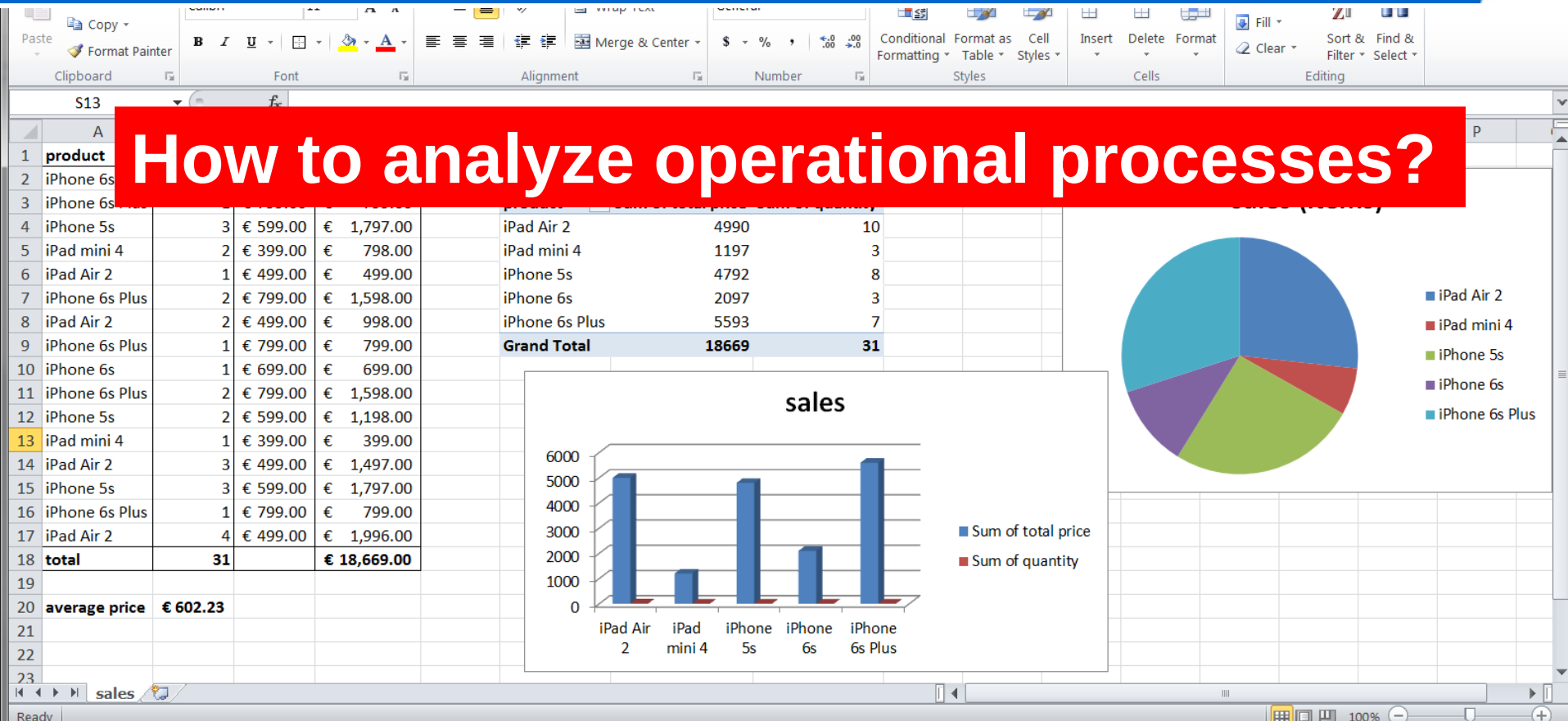
The table is highlighted with a red border. A blue callout labeled 'fact' points to the 'iPhone 5s' row. A green callout labeled 'derived' points to the 'total price' column.

Spreadsheet: Static data

[illegible]

Spreadsheet: Static data

How to analyze operational processes?



Process Mining: Spreadsheet for behavior

	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging	somebody	2007/09/11 13:21:27.000
3	185783	030 Vastleggen toekomstige adres	somebody	2007/09/11 13:26:29.000
4	185783	050 Plannen van toekomstige activiteiten	somebody	2007/09/11 13:26:29.000
5	185783	060 Aanvragen van formulier	somebody	2007/09/11 13:26:29.000
6	185783	070 Is 1e in gebreke staande?	somebody	2007/09/11 13:26:29.000
7	185783	100 Geraden maken	somebody	2007/09/11 13:26:29.000
8	185783	120 Plannen van toekomstige activiteiten	somebody	2007/09/24 10:55:56.000
9	185783	400 Inspectie uitgevoerd?	somebody	2007/09/24 10:55:56.000
10	185783	440 Zijn er nieuwe of niet herstelde gebreken?	somebody	2007/09/24 10:56:06.000
11	185783	450 Krijgt de huurder tijd om te herstellen?	somebody	2007/09/24 10:56:10.000
12	185783	500 Beoordelen/wijzigen leegstandsoort	somebody	2007/09/24 10:57:02.000
13	185783	110 Bepalen leegstandsoort	somebody	2007/09/24 10:57:42.000
14	185783	510 Is opleveringsformulier ondertekend?	somebody	2007/09/24 10:57:48.000
15	185783	130 Is het opleveringsformulier ondertekend?	somebody	2007/09/24 10:57:48.000
16	185783	140 Aanmaken 1e in gebreke staande?	somebody	2007/09/24 11:01:00.000
17	185783	150 Is er sprake van ZAV?	somebody	2007/09/24 11:37:00.000
18	185783	160 Aanpassen woningwaardering	somebody	2007/09/24 11:37:00.000
19	185783	170 Harmoniseren huurprijs	somebody	2007/09/24 11:40:00.000
20	185783	180 Bepalen kandidaat huurder	somebody	2007/09/24 11:47:40.000
21	185783	190 Aanpassen plattegrond	somebody	2007/09/24 12:10:58.000
22	185783	200 Stellen van de huurprijs	somebody	2007/10/30 11:00:00.000
23	185783	210 Stellen van de huurprijs	somebody	2007/10/30 11:00:00.000
24	185783	220 Stellen van de huurprijs	somebody	2007/10/30 11:00:00.000
25	185783	230 Stellen van de huurprijs	somebody	2007/10/30 11:00:00.000
26	185783	240 Stellen van de huurprijs	somebody	2007/11/28 12:00:00.000
27	185783	250 Is contract getekend en geld ontvangen?	somebody	2007/12/10 10:44:00.000
28	185783	300 Wijzigen status WMS (definitief geaccepteerd)	somebody	2007/12/11 16:26:14.000
29	185783	560 Opstellen eindnota	somebody	2007/12/12 11:19:41.000

row = event

resource

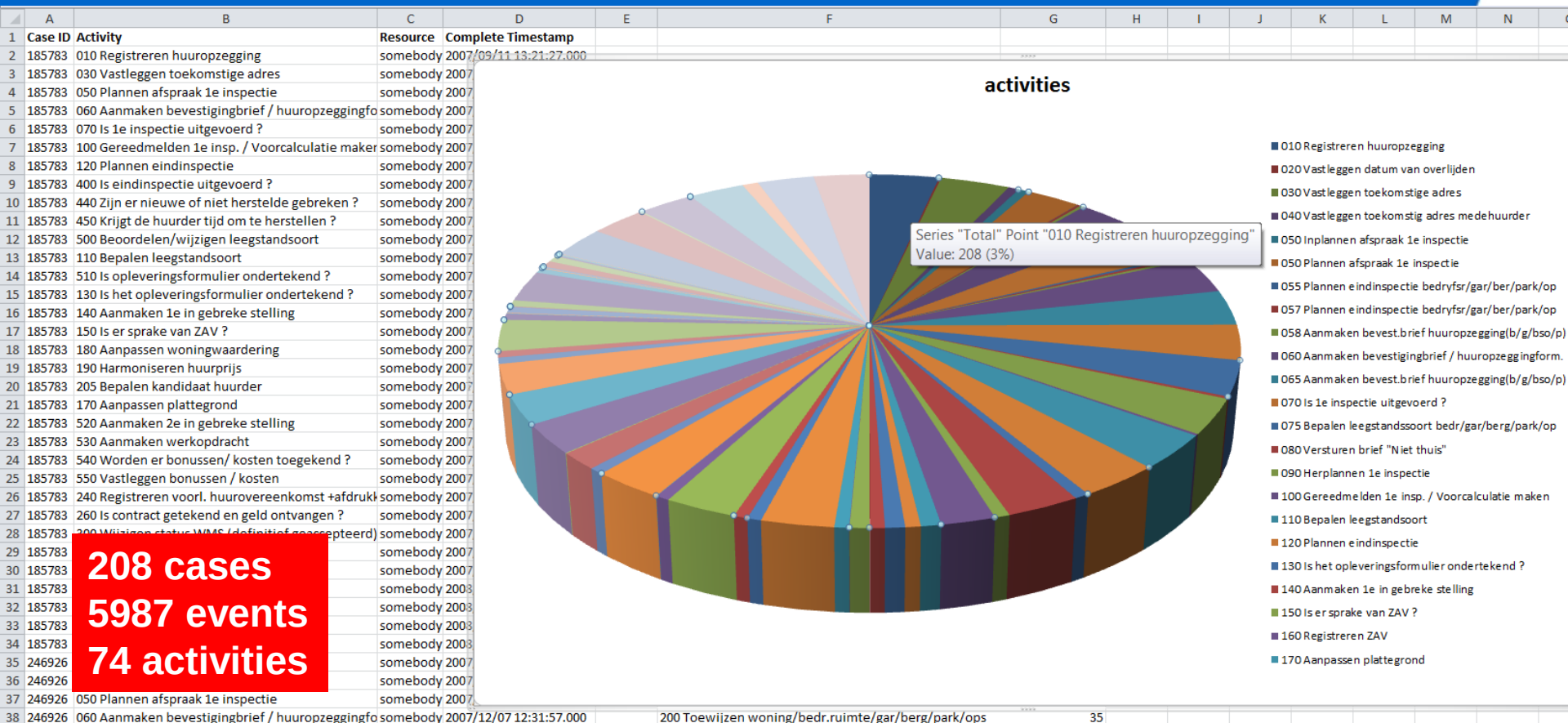
case
identifier

activity
name

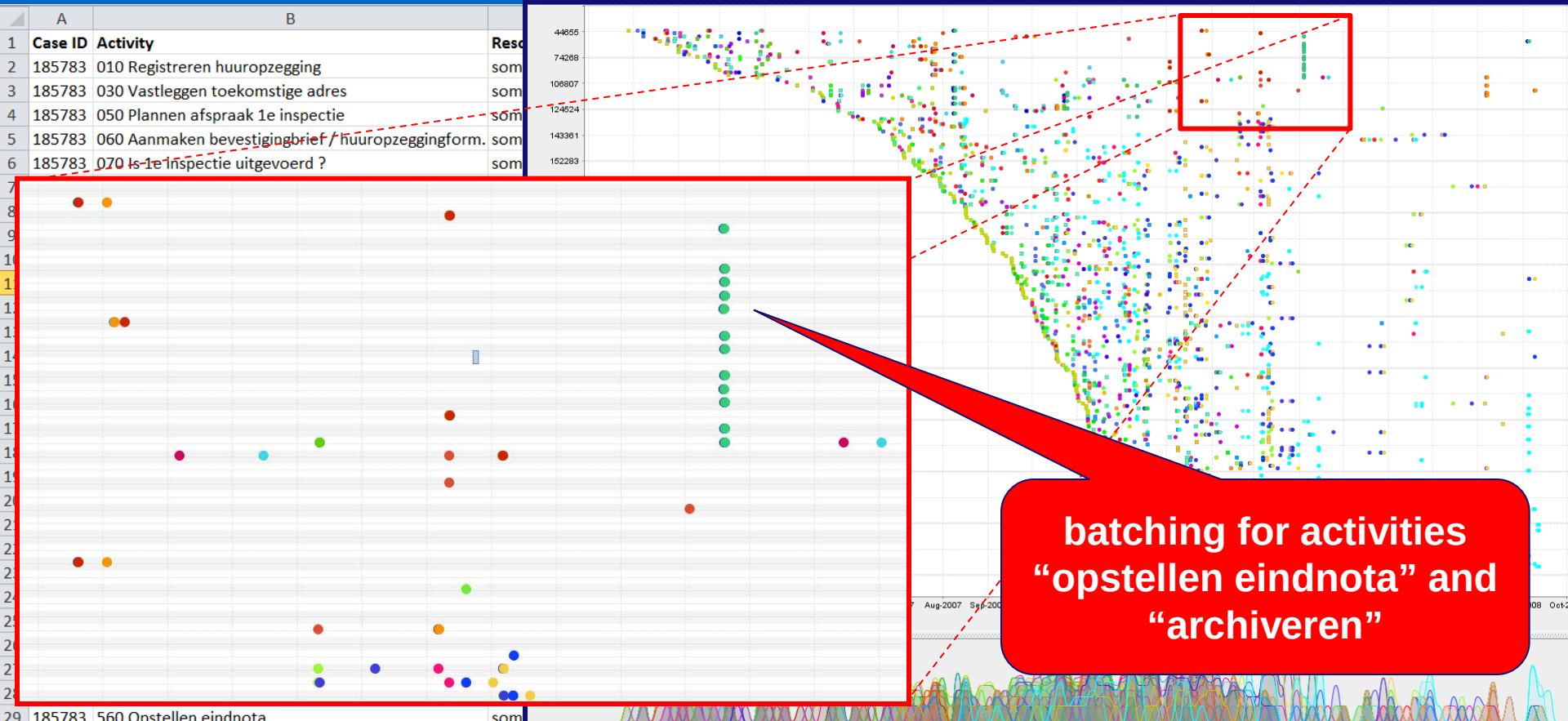
timestamp

- Input: **events** (“things that have happened”)
- Mandatory per event:
 - **case identifier**
 - **activity name**
 - **timestamp/date**
- Optional
 - **resource**
 - **transaction type**
 - **costs**
 - ...

Process Mining: Spreadsheet for behavior



Process Mining: Spreadsheet for behavior



A young girl with brown hair, wearing a bright pink puffer jacket and blue pants, is riding a red and white bicycle on a dirt path. The path is situated between a paved road on the left and a grassy area on the right. In the background, there is a road intersection with traffic lights and some trees. Two callout boxes are present: one on the left pointing to the girl, and one on the right pointing to a line on the grass.

**Loesje van
der Aalst**

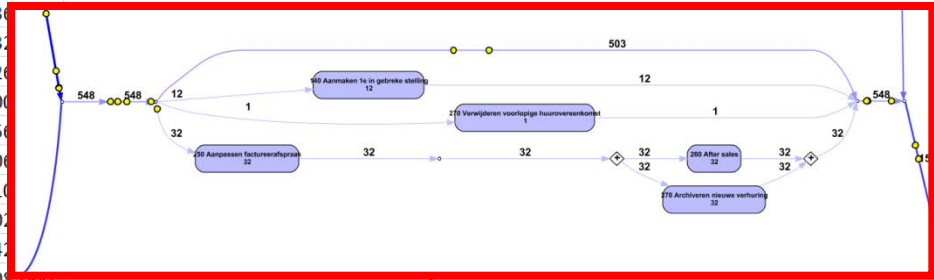
desire line

Process Discovery

Process Mining: Spreadsheet for behavior

	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging	somebody	2007/09/11 13:21:27.000
3	185783	030 Vastleggen toekomstige adres	somebody	2007/09/11 13:26:29.000
4	185783	050 Plannen afspraak 1e inspectie	somebody	2007/09/11 13:29:34.000
5	185783	060 Aanmaken bevestigingsbrief / huuropzeggingform.	somebody	2007/09/11 13:41:36.000
6	185783	070 Is 1e inspectie uitgevoerd ?	somebody	2007/09/24 08:39:32.000
7	185783	100 Is 1e inspectie / Voorcalculatie maken	somebody	2007/09/24 08:41:26.000
8	185783	120 Is 1e inspectie gesteld gebreken ?	somebody	2007/09/24 08:51:00.000
9	185783	400 Is 1e inspectie hersteld ?	somebody	2007/09/24 10:55:56.000
10	185783	400 Is 1e inspectie hersteld ?	somebody	2007/09/24 10:56:00.000
11	185783	400 Is 1e inspectie hersteld ?	somebody	2007/09/24 10:56:10.000
12	185783	500 Is 1e inspectie gesteld gebreken ?	somebody	2007/09/24 10:57:00.000
13	185783	110 Is 1e inspectie gesteld gebreken ?	somebody	2007/09/24 10:57:42.000
14	185783	510 Is opleveringsformulier ondertekend ?	somebody	2007/09/24 10:58:06.000
15	185783	130 Is het opleveringsformulier ondertekend ?	somebody	2007/09/24 10:58:19.000
16	185783	140 Aanmaken 1e in gebreke stelling	somebody	2007/09/24 11:01:58.000
17	185783	150 Is er sprake van ZAV ?	somebody	2007/09/24 11:37:33.000
18	185783	180 Aanpassen woningwaardering	somebody	2007/09/24 11:37:44.000
19	185783	190 Harmoniseren huurprijs	somebody	2007/09/24 11:40:01.000
20	185783	205 Bepalen kandidaat huurder	somebody	2007/09/24 11:47:42.000

process discovery



NO
modeling
needed!

Process Mining: Spreadsheet for behavior

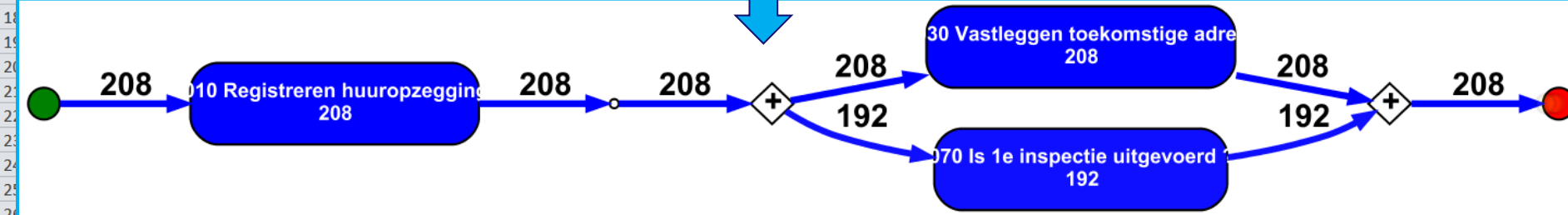
	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging	somebody	2007/09/11 13:21:27.000

process discovery

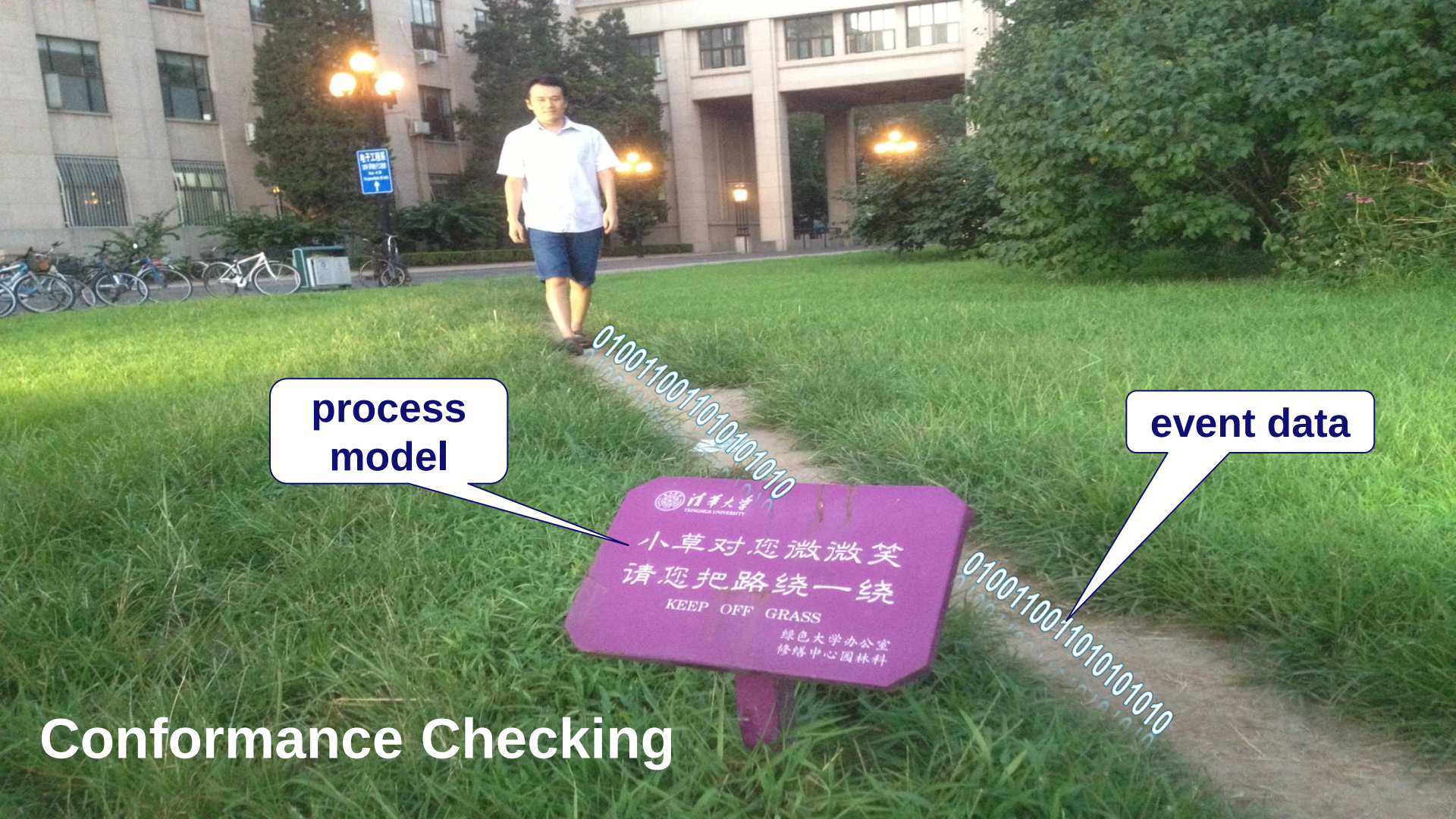


NO
modeling
needed!

9	185783	400 Is eindinspectie uitgevoerd ?	somebody	2007/09/24 10:55:56.000
16	185783	140 Aanmaken 1e in gebreke stelling	somebody	2007/09/24 11:01:58.000
17	185783	150 Is er sprake van ZAV ?	somebody	2007/09/24 11:37:33.000



27	185783	260 Is contract getekend en geld ontvangen ?	somebody	2007/12/10 10:44:06.000
28	185783	300 Wijzigen status WMS (definitief geaccepteerd)	somebody	2007/12/11 16:26:14.000
29	185783	560 Onstellen eindnota	somebody	2007/12/12 11:19:41.000



process
model

event data

Conformance Checking

A photograph of a golf course. A paved path leads from the foreground towards a green in the background. A wooden fence with dark posts and horizontal rails crosses the path. To the left of the path, there is a sandy area with sparse grass. A callout box labeled 'desire line' points to a faint, light-colored line in the grass on the left. Another callout box labeled 'very safe system' points to the wooden fence. The overall scene is bright and sunny.

desire line

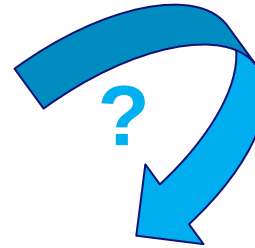
**very safe
system**

Conformance Checking

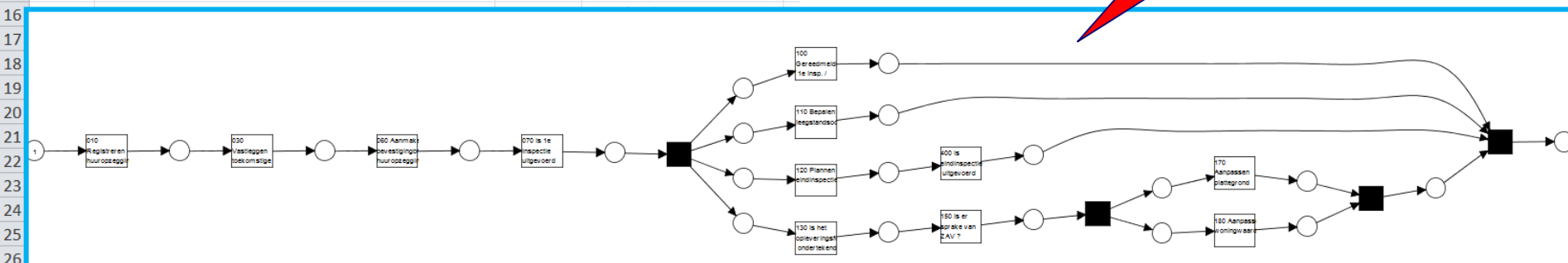
Process Mining: Spreadsheet for behavior

	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging	somebody	2007/09/11 13:21:27.000
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4	185783	050 Plannen afspraak 1e inspectie	somebody	2007/09/11 13:29:34.000
5	185783	060 Aanmaken bevestigingsbrief / huuropzeggingform.	somebody	2007/09/11 13:41:36.000
6	185783	070 Is 1e inspectie uitgevoerd ?	somebody	2007/09/24 08:39:32.000
7	185783	100 Gereedmelden 1e insp. / Voorcalculatie maken	somebody	2007/09/24 08:41:26.000
8	185783	120 Plannen eindinspectie	somebody	2007/09/24 08:51:00.000
9	185783	400 Is eindinspectie uitgevoerd ?	somebody	2007/09/24 10:55:56.000
10	185783	440 Zijn er nieuwe of niet herstelde gebreken ?	somebody	2007/09/24 10:56:06.000
11	185783	450 Krijgt de huurder tijd om te herstellen ?	somebody	2007/09/24 10:56:10.000
12	185783	500 Beoordelen/wijzigen leegstandsoort	somebody	2007/09/24 10:57:02.000
13	185783	110 Bepalen leegstandsoort	somebody	2007/09/24 10:57:42.000
14	185783	510 Is opleveringsformulier ondertekend ?	somebody	2007/09/24 10:58:08.000
15	185783	130 Is het opleveringsformulier ondertekend ?	somebody	2007/09/24 10:58:19.000

conformance checking



**discovered or
hand-made**

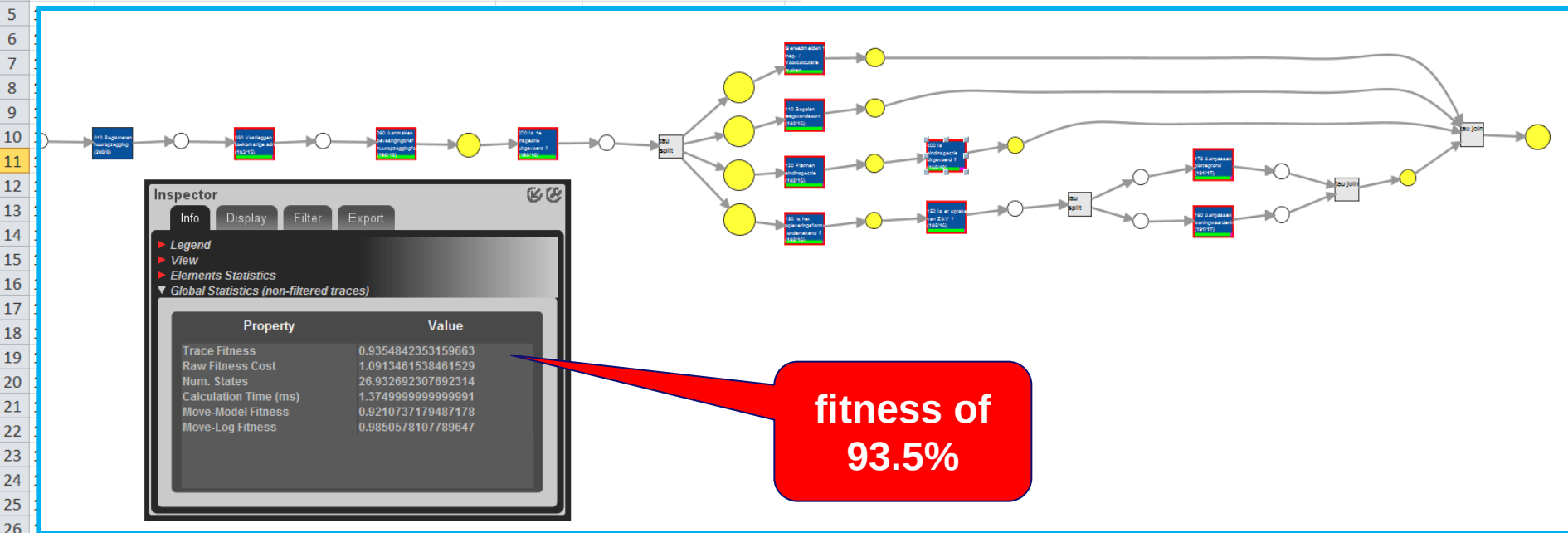


27	185783	260 Is contract getekend en geld ontvangen ?	somebody	2007/12/10 10:44:06.000
28	185783	300 Wijzigen status WMS (definitief geaccepteerd)	somebody	2007/12/11 16:26:14.000
29	185783	560 Onstellen eindnota	somebody	2007/12/12 11:19:41.000

Process Mining: Spreadsheet for behavior

	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging	somebody	2007/09/11 13:21:27.000
3	185783	030 Vastleggen toekomstige adres	somebody	2007/09/11 13:26:29.000
4	185783	050 Plannen afspraak 1e inspectie	somebody	2007/09/11 13:29:34.000

conformance checking

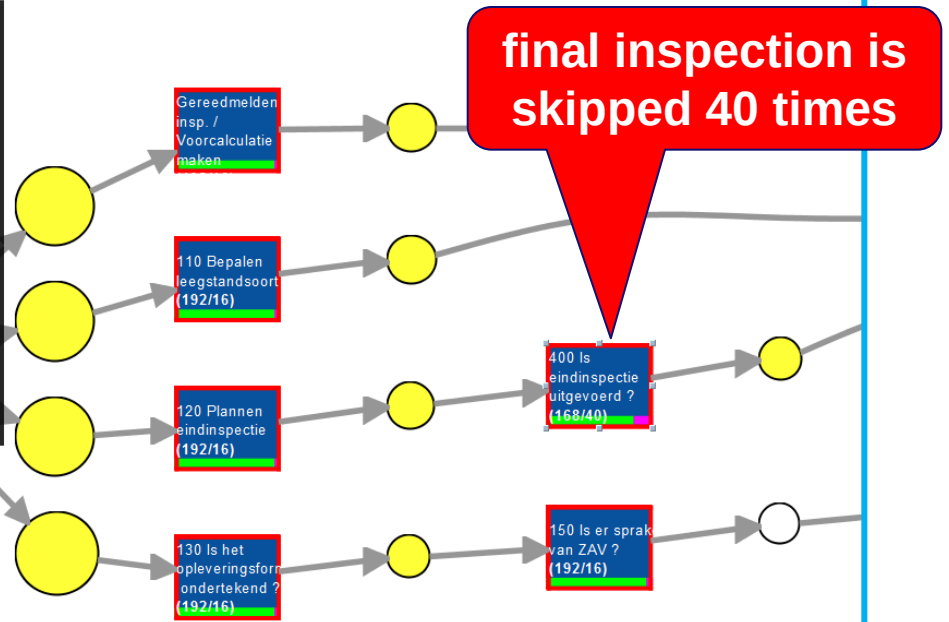
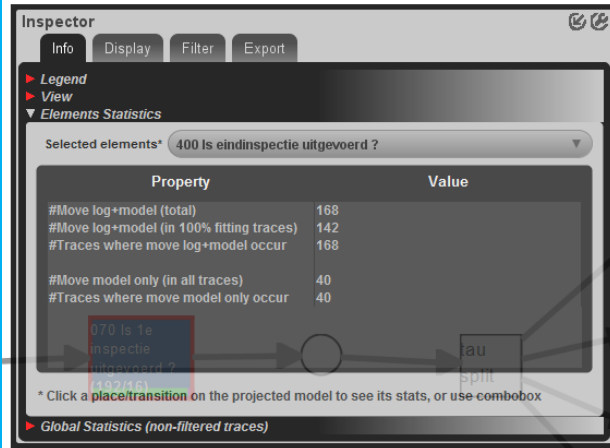


27	185783	260 Is contract getekend en geld ontvangen ?	somebody	2007/12/10 10:44:06.000
28	185783	300 Wijzigen status WMS (definitief geaccepteerd)	somebody	2007/12/11 16:26:14.000
29	185783	560 Opstellen eindnota	somebody	2007/12/12 11:19:41.000

Process Mining: Spreadsheet for behavior

	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging	somebody	2007/09/11 13:21:27.000
3	185783	030 Vastleggen toek		
4	185783	050 Plannen afspraak		
5	185783	060 Aanmaken beves		
6	185783	070 Is 1e inspectie uit		
7	185783	100 Gereedmelden 1e		
8	185783	120 Plannen eindinspe		
9	185783	400 Is eindinspectie u		
10	185783	440 Zijn er nieuwe of		
11	185783	450 Krijgt de huurder		
12	185783	500 Beoordelen/wijzi		
13	185783	110 Bepalen leegstan		
14	185783	510 Is opleveringsform		
15	185783	130 Is het opleverings		
16	185783	140 Aanmaken 1e in g		
17	185783	150 Is er sprake van Z		
18	185783	180 Aanpassen wonin		
19	185783	190 Harmoniseren hu		
20	185783	205 Bepalen kandida		
21	185783	170 Aanpassen platte		
22	185783	520 Aanmaken 2e in g		
23	185783	530 Aanmaken werko		
24	185783	540 Worden er bonus		
25	185783	550 Vastleggen bonus		
26	185783	240 Registreren voor		
27	185783	260 Is contract getekend en geld ontvangen ?	somebody	2007/12/10 10:44:06.000
28	185783	300 Wijzigen status WMS (definitief geaccepteerd)	somebody	2007/12/11 16:26:14.000
29	185783	560 Opstellen eindnota	somebody	2007/12/12 11:19:41.000

conformance checking



Process Mining: Spreadsheet for behavior

	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging		
3	185783	030 Vastleggen toekomstige adres		
4	185783	050 Plannen afspraak 1e inspectie		
5	185783	060 Aanmaken bevestigingsbrief / huuropzeg		
6	185783	070 Is 1e inspectie uitgevoerd ?		
7	185783	100 Gereedmelden 1e insp. / Voorcalculatie		
8	185783	120 Plannen eindinspectie		
9	185783	400 Is eindinspectie uitgevoerd ?		
10	185783	440 Zijn er nieuwe of niet herstelde gebreken ?		
11	185783	450 Krijgt de huurder tijd om te herstellen ?		
12	185783	500 Beoordelen/wijzigen leegstandsoort		
13	185783	110 Bepalen leegstandsoort		
14	185783	510 Is opleveringsformulier ondertekend ?		
15	185783	130 Is het oplevering		
16	185783	140 Aanmaken 1e i		
17	185783	150 Is er sprake van		
18	185783	180 Aanpassen wor		
19	185783	190 Harmoniseren i		
20	185783	205 Bepalen kandid		
21	185783	170 Aanpassen plat		
22	185783	520 Aanmaken 2e i		
23	185783	530 Aanmaken werkopdracht		
24	185783	540 Worden er bonussen/ kosten toegekend ?		
25	185783	550 Vastleggen bonussen / kosten		
26	185783	240 Registreren voorl. huurovereenkomst +afdrukken		
27	185783	260 Is contract getekend en geld ontvangen ?		
28	185783	300 Wijzigen status WMS (definitief geaccepteerd)		
29	185783	560 Opstellen eindnota		

move on model
(something should have
happened, but did not)

move on log
(something happened that
should not happen)

conformance checking

Case id(s): 80437

Num. Cases

2

Is Alignment Reliable?

Yes

Trace Fitness

0.96

Alignment
16 events



Alignment
16 events



Alignment
18 events



Case id(s): 192867

Num. Cases

1

Is Alignment Reliable?

Yes

Trace Fitness

0.92

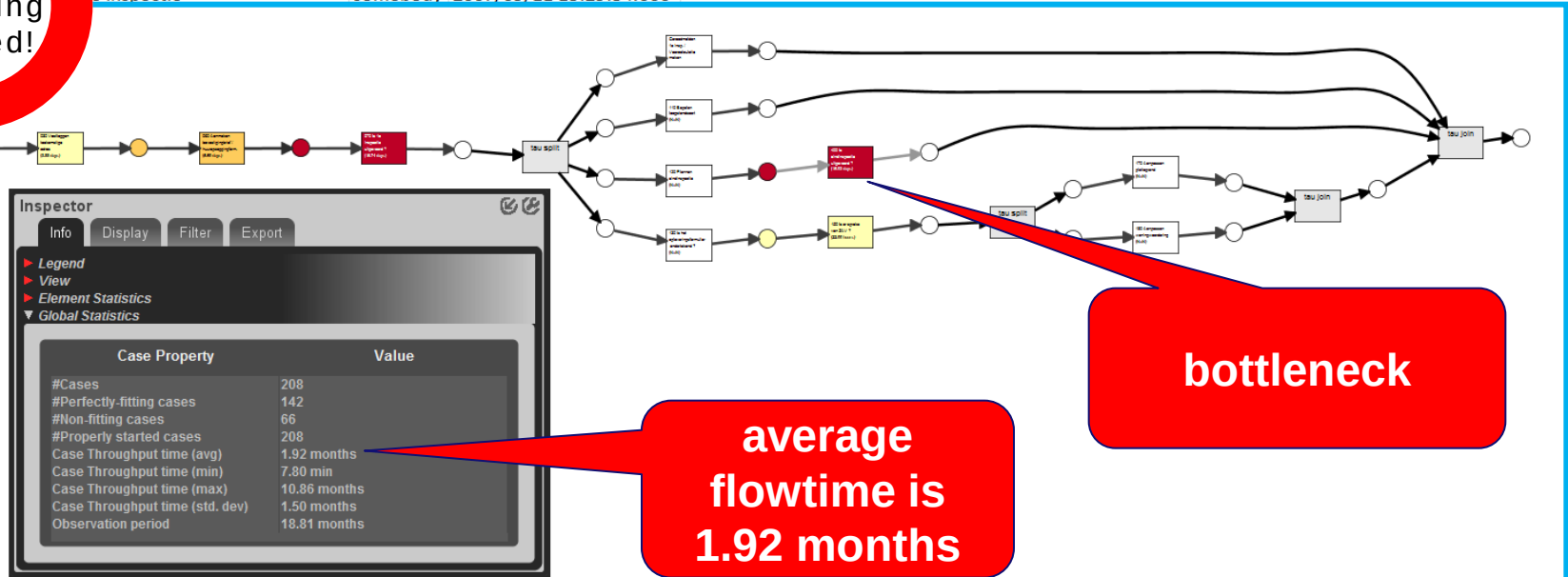
Alignment
18 events



Process Mining: Spreadsheet for behavior

NO
modeling
needed!

performance analysis



average
flowtime is
1.92 months

bottleneck

26	185783	240 Registreren voorl. huurovereenkomst +afdrukken	somebody	2007/11/28 12:34:23.000
27	185783	260 Is contract getekend en geld ontvangen ?	somebody	2007/12/10 10:44:06.000
28	185783	300 Wijziggen status WMS (definitief geaccepteerd)	somebody	2007/12/11 16:26:14.000
29	185783	560 Onstellen eindnota	somebody	2007/12/12 11:19:41.000

Process Mining: Spreadsheet for behavior

	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging	somebody	2007/12/12 11:19:41.000
3	185783	030 Vastleggen toekomstige adres	somebody	2007/12/12 11:19:41.000
4	185783	050 Aanmaken bevestigingsbrief / huuropzeggingform	somebody	2007/12/12 11:19:41.000
5	185783	060 A		
6	185783	070 Is ie inspectie uitgevoerd ?		
7	185783	100 G		
8	185783	120 P		
9	185783	400 Is		
10	185783	440 Z		
11	185783	450 K		
12	185783	500 B		
13	185783	110 B		
14	185783	510 Is		
15	185783	130 Is		
16	185783	140 A		
17	185783	150 Is		
18	185783	180 A		
19	185783	190 H		
20	185783	205 B		
21	185783	170 A		
22	185783	520 A		
23	185783	530 A		
24	185783	540 V		
25	185783	550 V		
26	185783	240 R		
27	185783	260 Is		
28	185783	300 V		
29	185783	560 Onstellen eindnota	somebody	2007/12/12 11:19:41.000

performance analysis

waiting time of
15.74 days

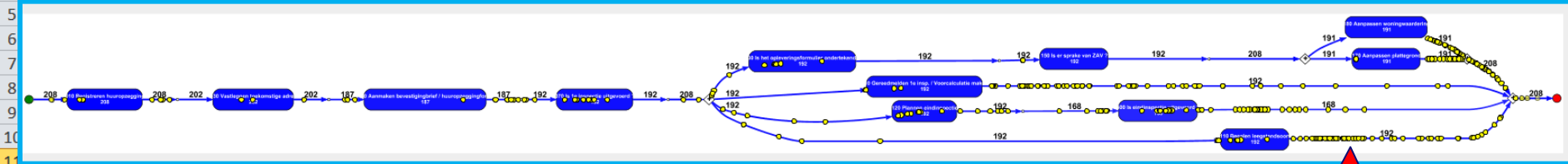
NO
modeling
needed!

Inspector						
Info Display Filter Export						
Legend						
View						
Element Statistics						
Selected elements* sink 5						
Property	Min.	Max.	Avg.	Std. Dev.	Freq.	
Waiting time	6.00 seconds	9.10 months	15.74 days	24.52 days	192	
Synchroniza...	0.00 ms	0.00 ms	0.00 ms	0.00 ms	192	
Sojourn time	6.00 seconds	9.10 months	15.74 days	24.52 days	192	

Process Mining: Spreadsheet for behavior

	A	B	C	D
1	Case ID	Activity	Resource	Complete Timestamp
2	185783	010 Registreren huuropzegging	somebody	2007/09/11 13:21:27.000
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4	185783	050 Plannen afspraak 1e inspectie	somebody	2007/09/11 13:29:34.000

animating reality



11	185783	500 Beoordelen/wijzigen leegstandsoort	somebody	2007/09/24 10:57:02.000
12	185783	110 Bepalen leegstandsoort	somebody	2007/09/24 10:57:42.000
13	185783	510 Is opleveringsformulier ondertekend ?	somebody	2007/09/24 10:58:08.000
14	185783	130 Is het opleveringsformulier ondertekend ?	somebody	2007/09/24 10:58:19.000
15	185783	140 Aanmaken 1e in gebreke stelling	somebody	2007/09/24 11:01:58.000
16	185783	150 Is er sprake van ZAV ?	somebody	2007/09/24 11:37:33.000
17	185783	180 Aanpassen woningwaardering	somebody	2007/09/24 11:37:44.000
18	185783	190 Harmoniseren huurprijs	somebody	2007/09/24 11:40:01.000
19	185783	205 Bepalen kandidaat huurder	somebody	2007/09/24 11:47:42.000
20	185783	170 Aanpassen plattegrond	somebody	2007/09/24 12:10:58.000
21	185783	520 Aanmaken 2e in gebreke stelling	somebody	2007/10/30 11:45:53.000
22	185783	530 Aanmaken werkopdracht	somebody	2007/10/30 11:46:09.000
23	185783	540 Worden er bonussen/ kosten toegekend ?	somebody	2007/10/30 11:46:36.000
24	185783	550 Vastleggen bonussen / kosten	somebody	2007/10/30 11:53:00.000
25	185783	240 Registreren voorl. huurovereenkomst +afdrukken	somebody	2007/11/28 12:34:23.000
26	185783	260 Is contract getekend en geld ontvangen ?	somebody	2007/12/10 10:44:06.000
27	185783	300 Wijzigen status WMS (definitief geaccepteerd)	somebody	2007/12/11 16:26:14.000
28	185783	560 Onstellen eindnota	somebody	2007/12/12 11:19:41.000

real cases

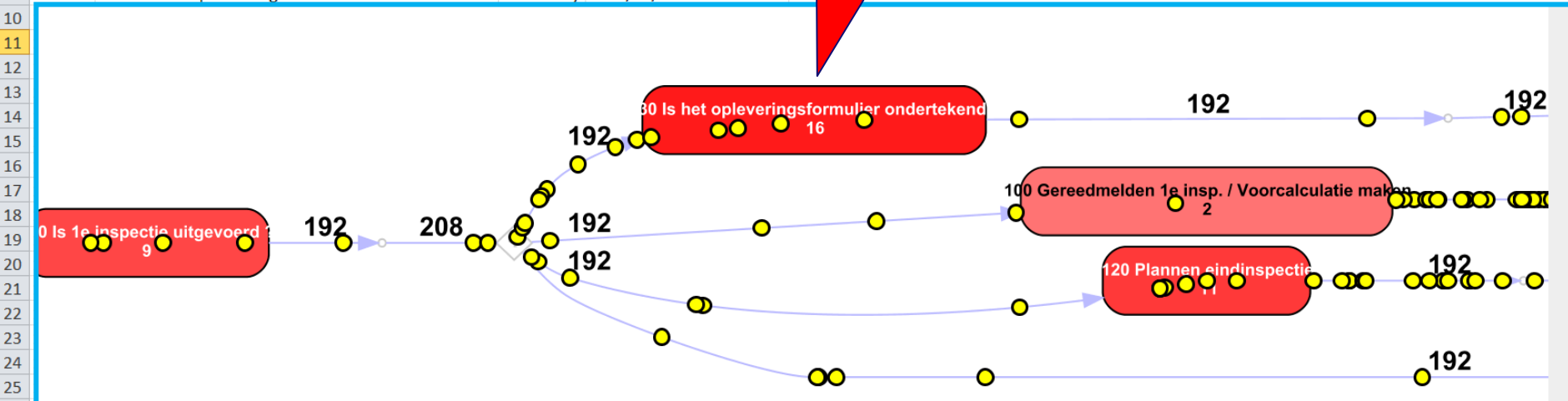
NO
modeling
needed!

Process Mining: Spreadsheet for behavior

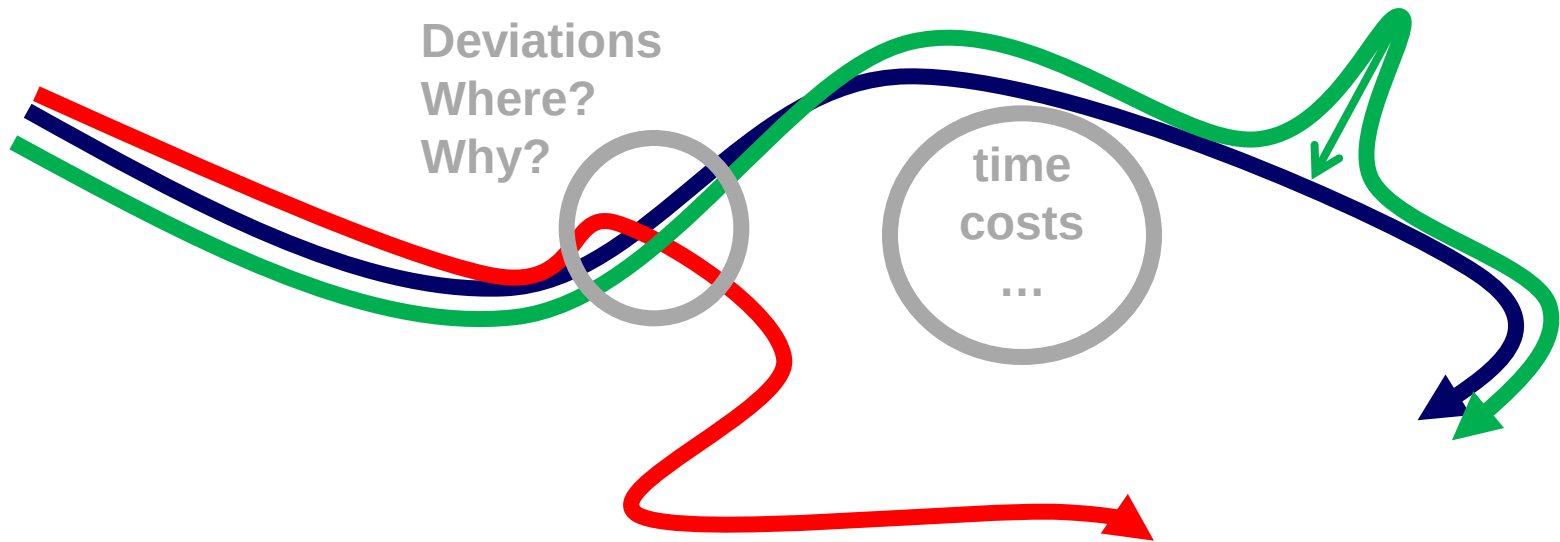
	A	B	C	D
1	Case ID	Activity	Resource	Completed
2	185783	010 Registreren huuropzegging	somebody	2007/09/24 08:41:26.000
3	185783	030 Vastleggen toekomstige adres	somebody	2007/09/24 08:51:00.000
4	185783	050 Plannen afspraak 1e inspectie	somebody	2007/09/24 10:55:56.000
5	185783	060 Aanmaken bevestigingsbrief / huuropzeggingform.	somebody	
6	185783	070 Is 1e inspectie uitgevoerd ?	somebody	
7	185783	100 Gereedmelden 1e insp. / Voorcalculatie maken	somebody	2007/09/24 08:41:26.000
8	185783	120 Plannen eindinspectie	somebody	2007/09/24 08:51:00.000
9	185783	400 Is eindinspectie uitgevoerd ?	somebody	2007/09/24 10:55:56.000

animating reality

16 cases are queueing

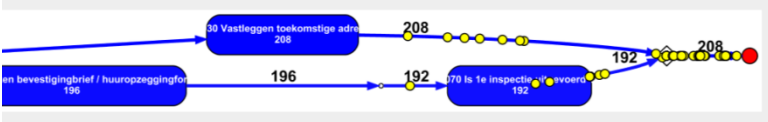


26	185783	240 Registreren voorl. huurovereenkomst +afdrucken	somebody	2007/11/28 12:34:23.000
27	185783	260 Is contract getekend en geld ontvangen ?	somebody	2007/12/10 10:44:06.000
28	185783	300 Wijzigen status WMS (definitief geaccepteerd)	somebody	2007/12/11 16:26:14.000
29	185783	560 Onstellen eindnota	somebody	2007/12/12 11:19:41.000

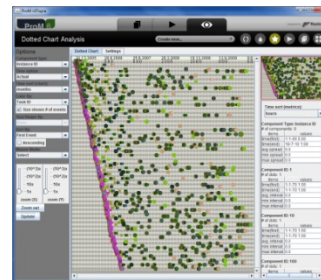
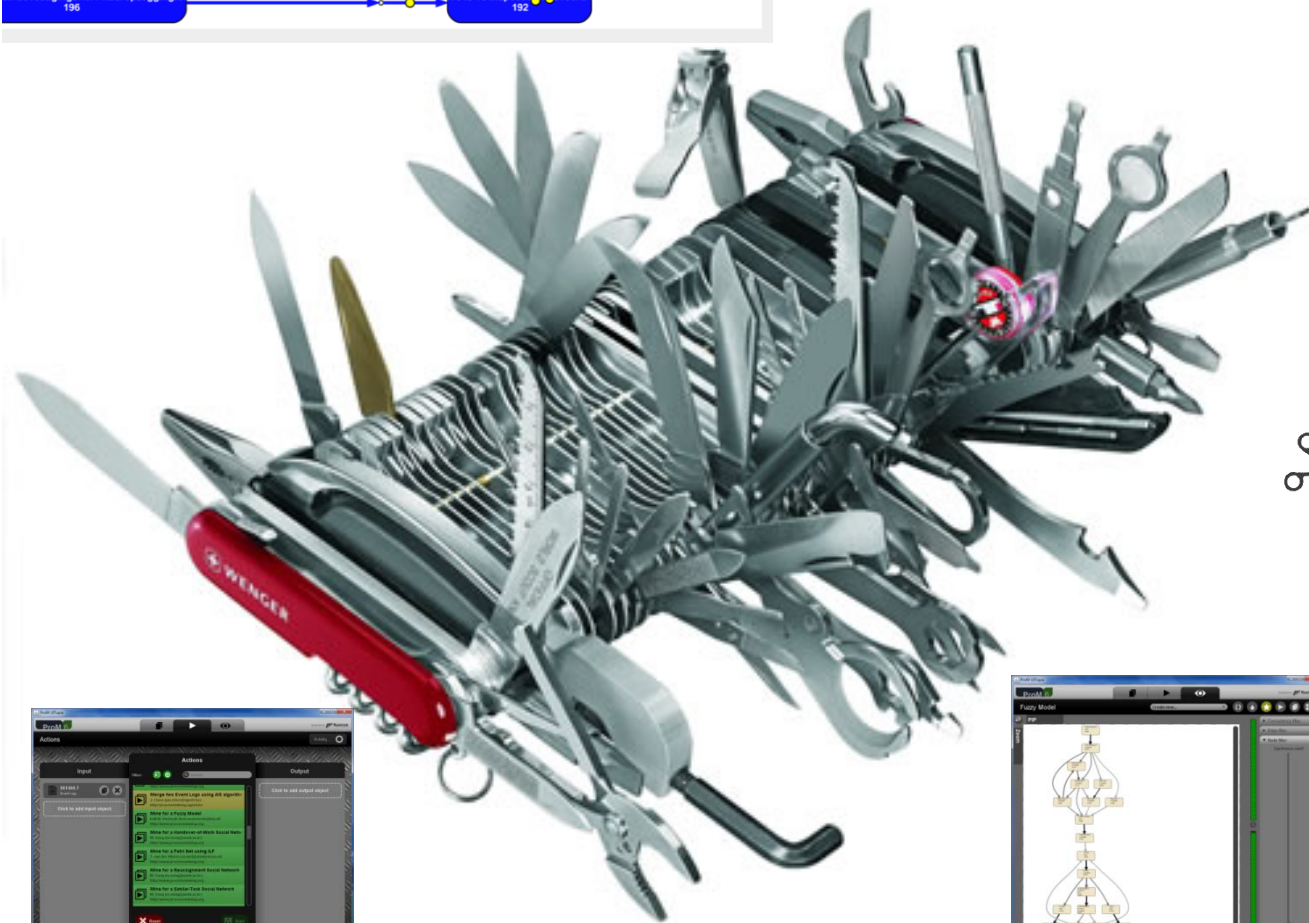


Process Mining Software



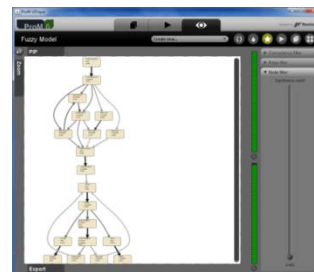


1500+ plug-ins available covering the whole process mining spectrum



100% FREE

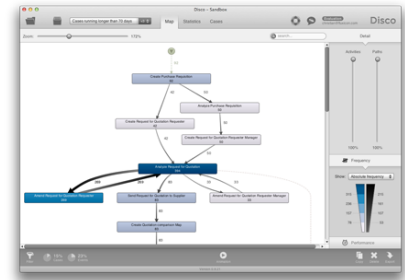
>128k downloads





Disco

perceptive software
a Lexmark company



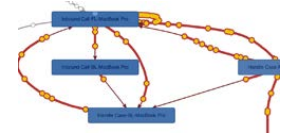
minit



Rialto

QPR
Quality. Processes. Results.

celonis
process mining



XMPRO
GET BETTER AT GETTING WORK DONE

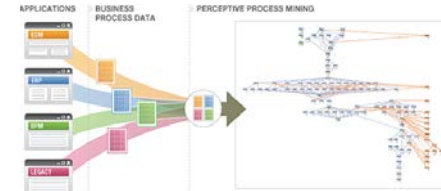
Software AG
Process Performance Manager
Discover, analyze and monitor:
the road to process improvement

my i nvenio

FUJITSU



stereologic



The Transformation Company

TU/e



Statistics views

Overview
Global statisticsActivity
Activity classesproduct
Other attributeprod-price
Other attribute

Overview

Global statistics

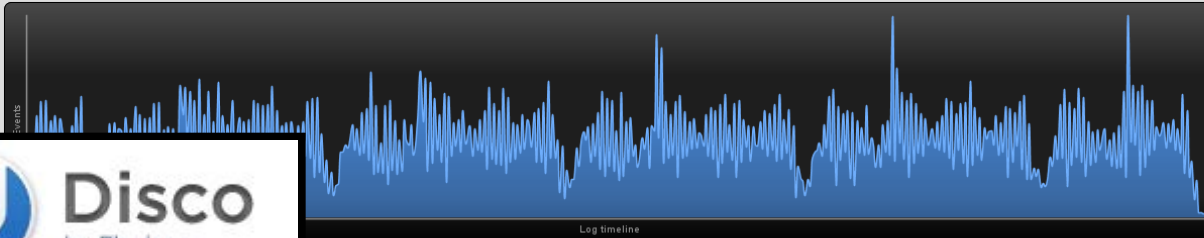
Events over time

Active cases over time

Case variants

Events per case

Case duration



Events 63,763

Cases 10,000

Activities 8

Median case duration 13.9 d

Mean case duration 14.9 d

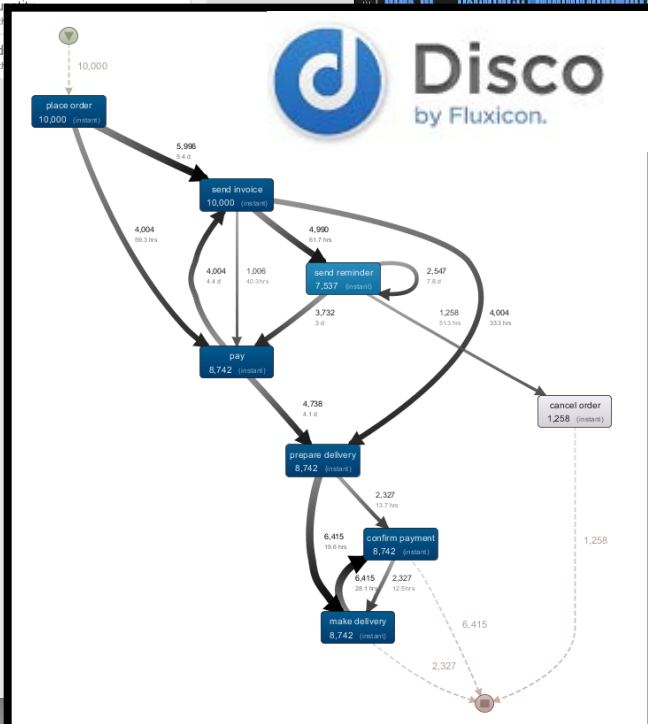
Start 05.01.2015 09:00:07

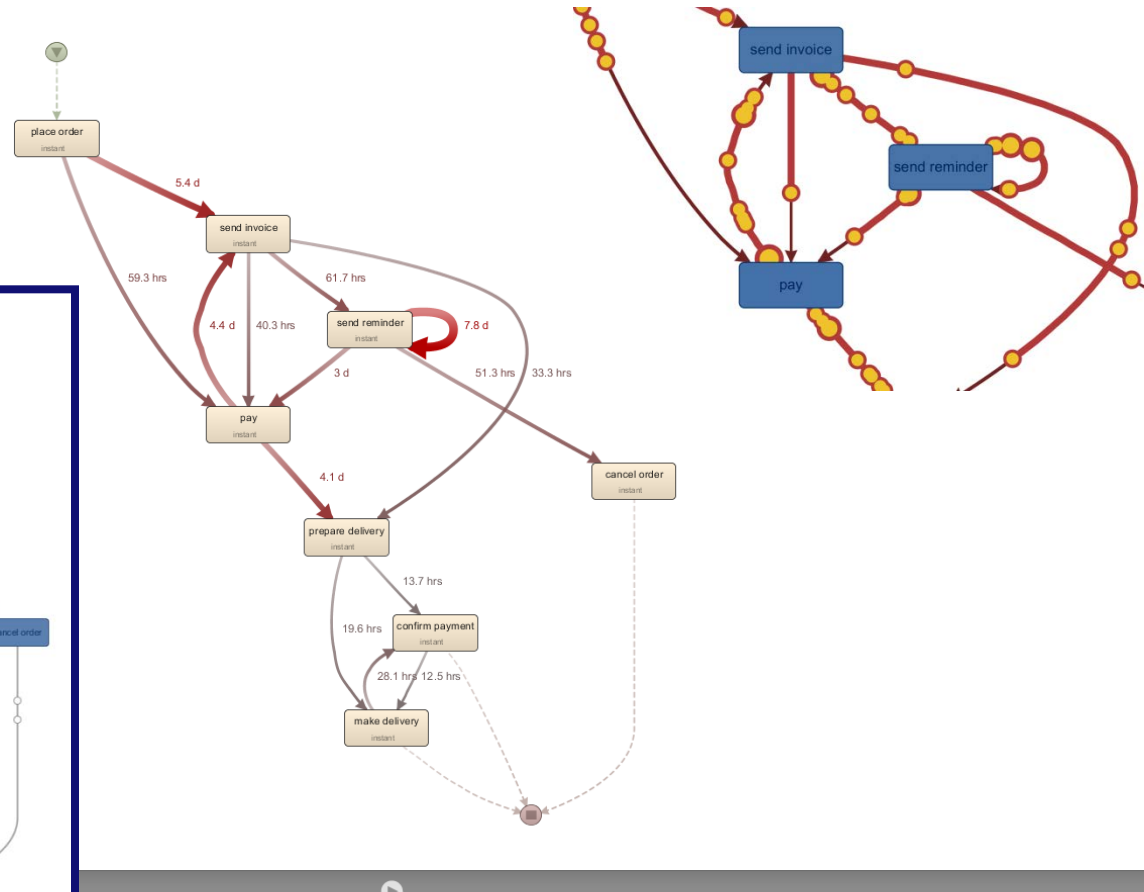
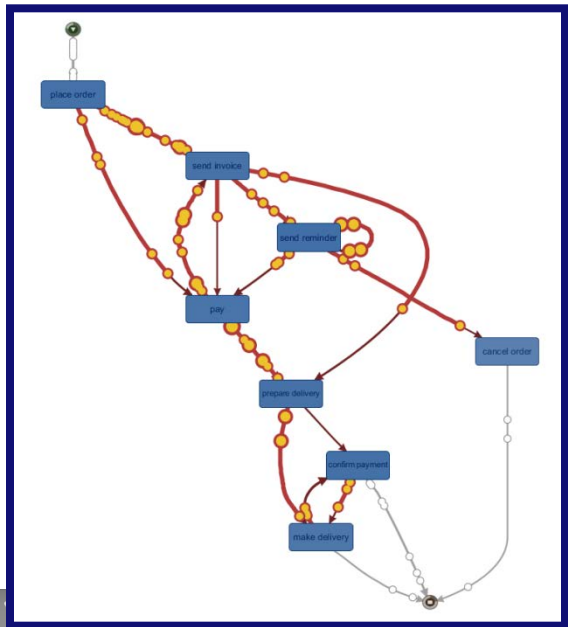
End 31.12.2019 14:46:02

Cases (10000)

Variants (9)

	Variant	Started	Finished	Duration
7		05.01.2015 09:00:07	26.01.2015 16:42:28	21 days, 7 hours
1		05.01.2015 10:18:21	15.01.2015 15:52:30	10 days, 5 hours
4		05.01.2015 11:54:49	09.01.2015 18:38:58	4 days, 6 hours
3		05.01.2015 14:07:45	22.01.2015 13:18:30	16 days, 23 hours
1		05.01.2015 15:33:38	12.01.2015 17:27:36	7 days, 1 hour
5		05.01.2015 17:25:23	02.02.2015 12:31:09	27 days, 19 hours
4		05.01.2015 19:08:53	15.01.2015 14:56:54	9 days, 19 hours
9		05.01.2015 21:54:00	13.01.2015 15:49:53	7 days, 17 hours
4		06.01.2015 07:25:13	15.01.2015 11:27:50	9 days, 4 hours
1		06.01.2015 10:09:51	15.01.2015 19:15:18	9 days, 9 hours
1		06.01.2015 11:37:49	14.01.2015 09:14:28	7 days, 21 hours
4		06.01.2015 13:33:45	14.01.2015 11:30:05	7 days, 21 hours
4		06.01.2015 15:25:38	13.01.2015 12:25:34	6 days, 20 hours
2		06.01.2015 17:09:23	22.01.2015 18:59:10	16 days, 1 hour
3		06.01.2015 18:36:53	22.01.2015 14:39:39	15 days, 20 hours
8		06.01.2015 21:26:54	26.01.2015 17:16:02	19 days, 19 hours
1		07.01.2015 04:42:36	16.01.2015 10:17:14	9 days, 5 hours
3		07.01.2015 10:10:58	21.01.2015 17:31:29	14 days, 7 hours
8		07.01.2015 11:40:04	28.01.2015 10:27:12	20 days, 22 hours
9		07.01.2015 13:38:15	13.01.2015 13:22:15	5 days, 23 hours
1		07.01.2015 15:34:37	19.01.2015 09:11:23	11 days, 17 hours
1		07.01.2015 17:27:21	16.01.2015 09:09:25	8 days, 15 hours
5		07.01.2015 19:12:50	03.02.2015 14:34:33	26 days, 19 hours
6		07.01.2015 22:01:54	19.01.2015 13:15:02	11 days, 15 hours
8		08.01.2015 07:12:36	28.01.2015 10:41:14	20 days, 3 hours
3		08.01.2015 09:55:59	26.01.2015 15:52:42	18 days, 5 hours
6		08.01.2015 12:10:05	15.01.2015 13:54:59	7 days, 1 hour
1		08.01.2015 13:38:17	14.01.2015 12:30:26	5 days, 22 hours
5		08.01.2015 15:34:42	02.02.2015 14:10:36	24 days, 22 hours
2		08.01.2015 17:27:31	29.01.2015 11:26:06	20 days, 17 hours
3		08.01.2015 19:13:09	26.01.2015 14:16:02	17 days, 19 hours
4		08.01.2015 22:02:32	20.01.2015 10:35:40	11 days, 12 hours





Activities

Paths

100% 100%

Frequency

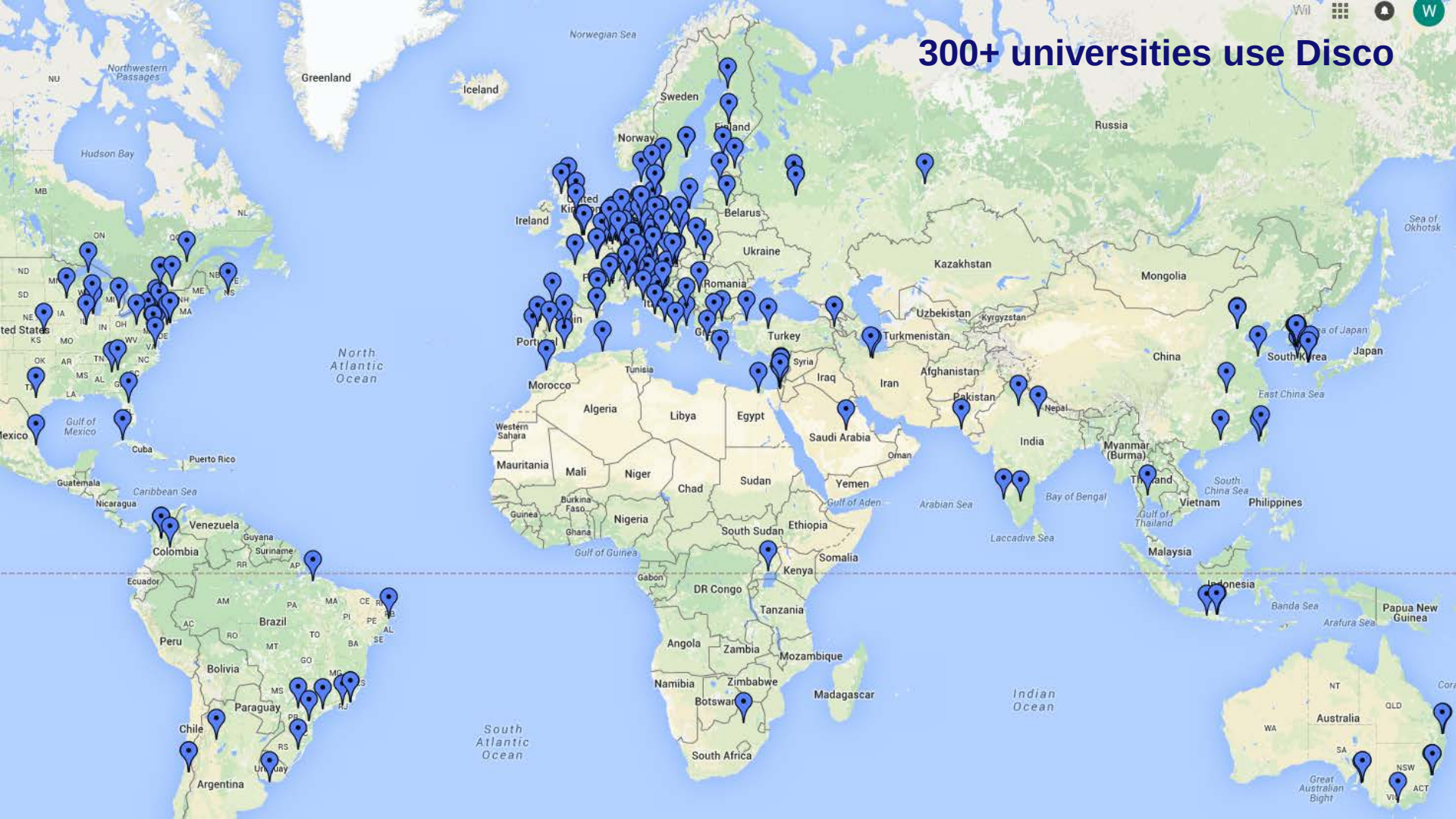
Performance

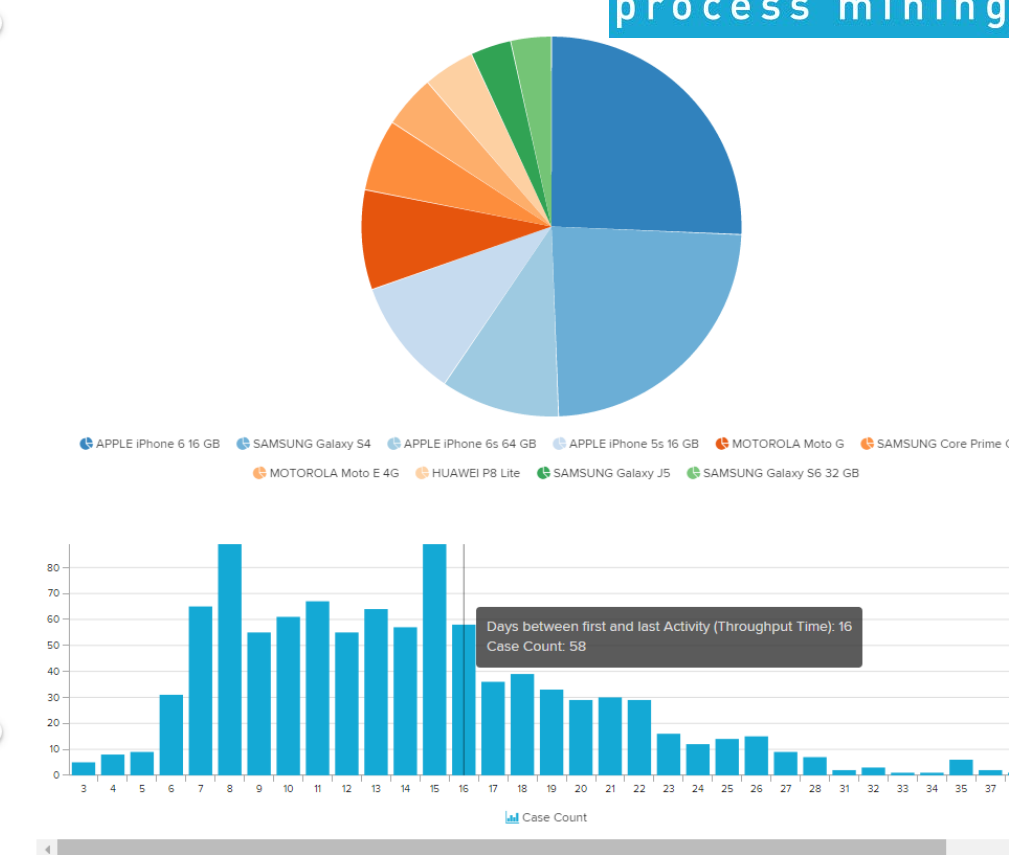
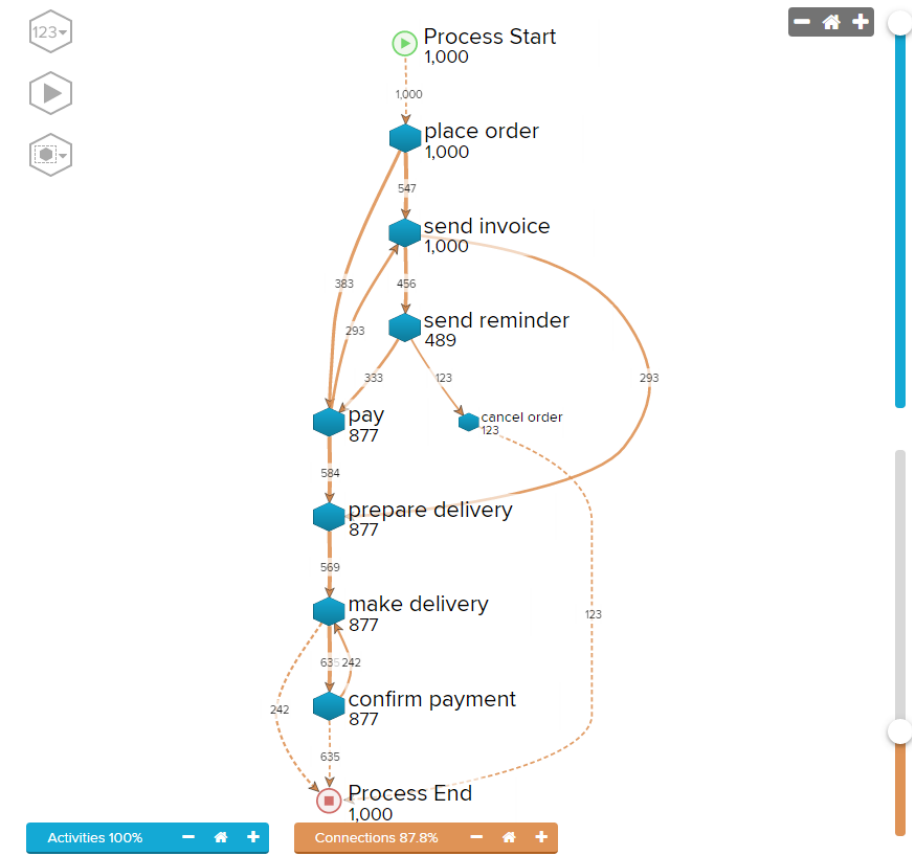
Show: Mean duration

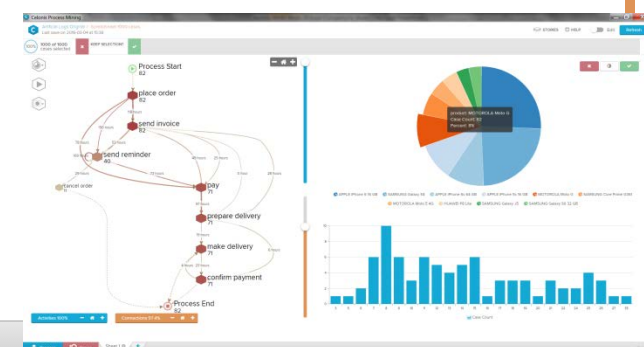
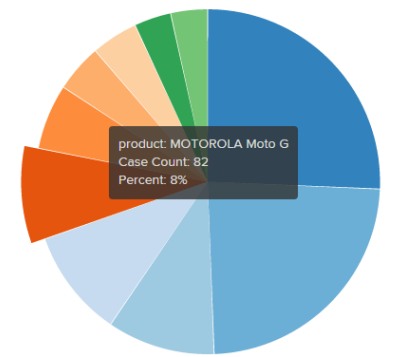
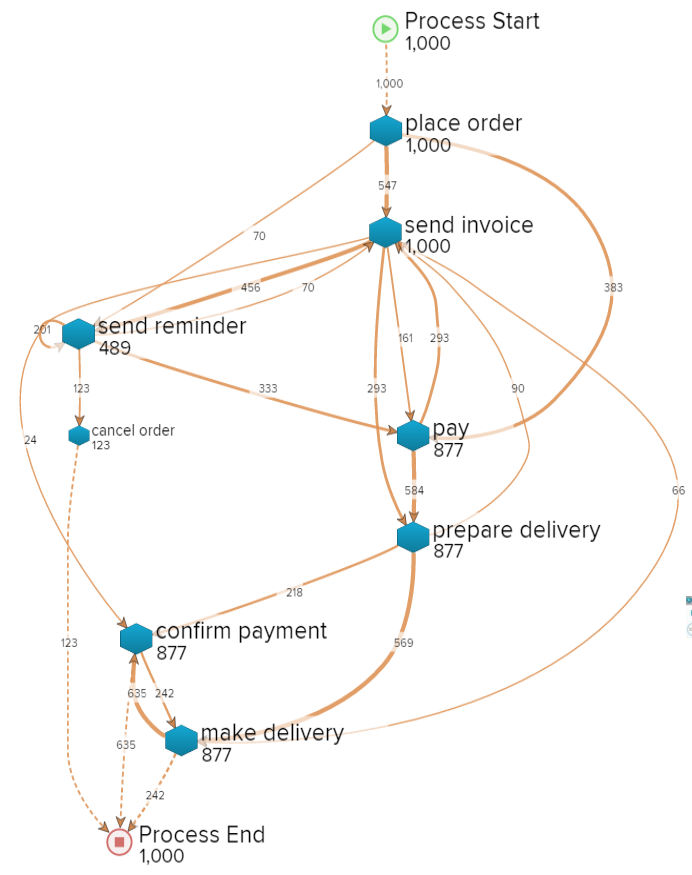
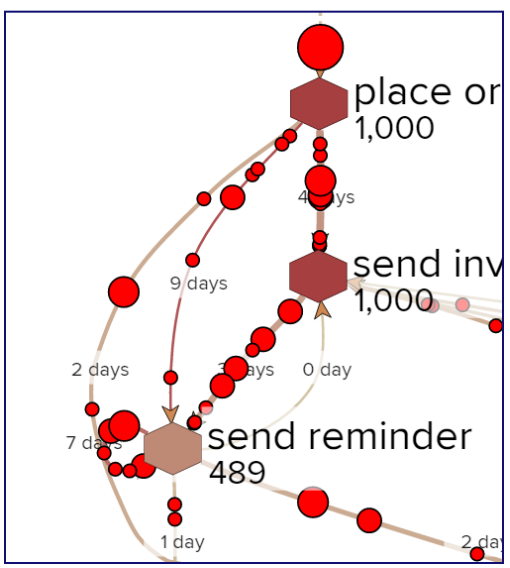
instant	6.3 d
instant	4.7 d
instant	3.1 d
instant	37.6 hrs

Add secondary metrics

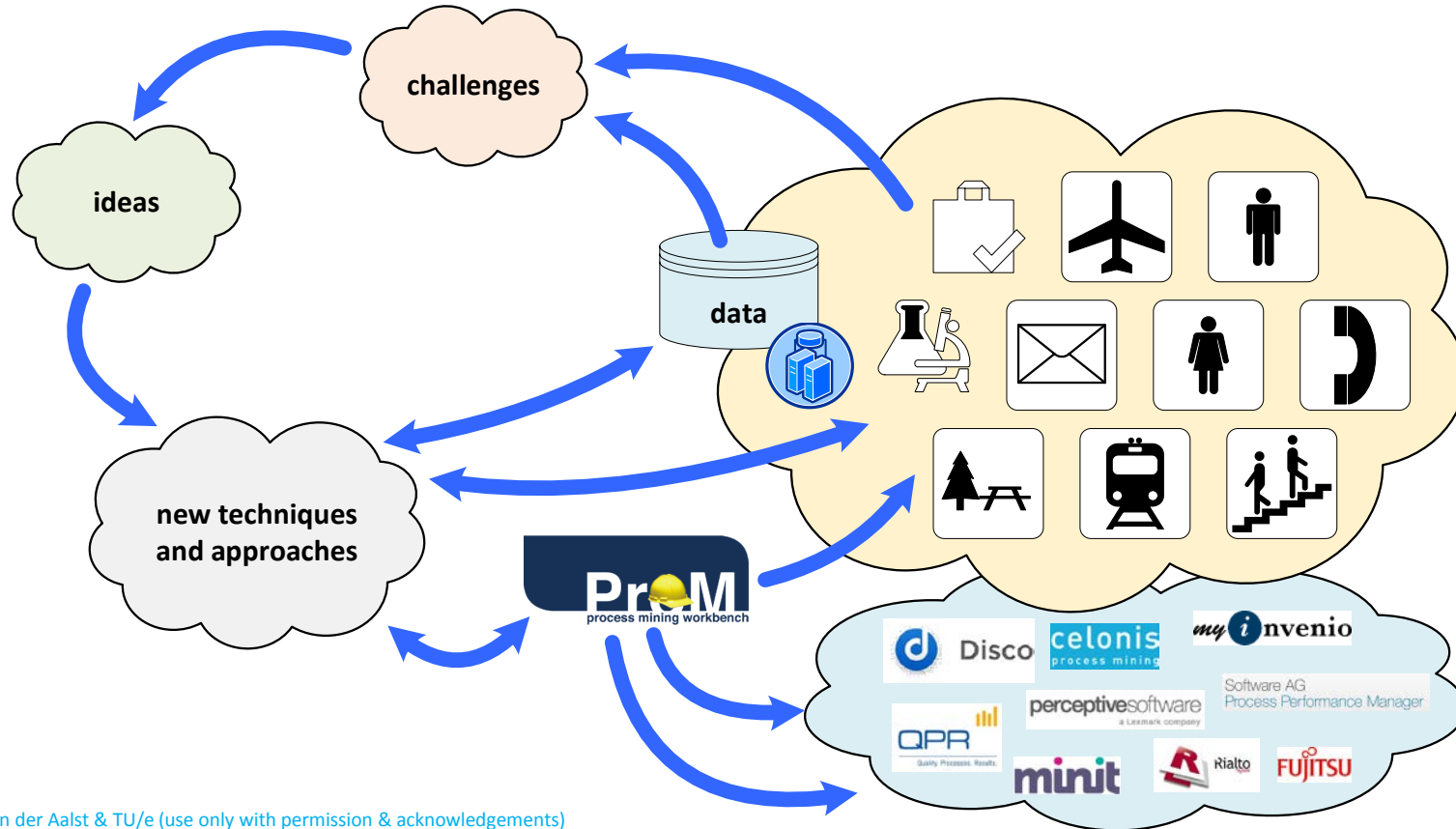
300+ universities use Disco







Interaction with industry



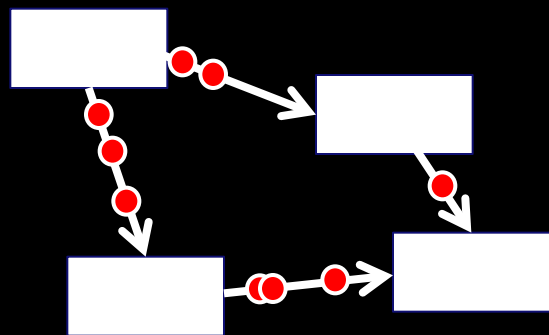
C11 (L) TOTAL

C1
25

A		B	C	D
ITEM		NO.	UNIT	COST
-----		---	---	---
MUCK	RAKE	43	12.95	556.85
BUZZ	CUT	15	6.75	101.25
TOE	TONER	250	49.95	12487.50
EYE	SNUFF	2	4.95	9.90

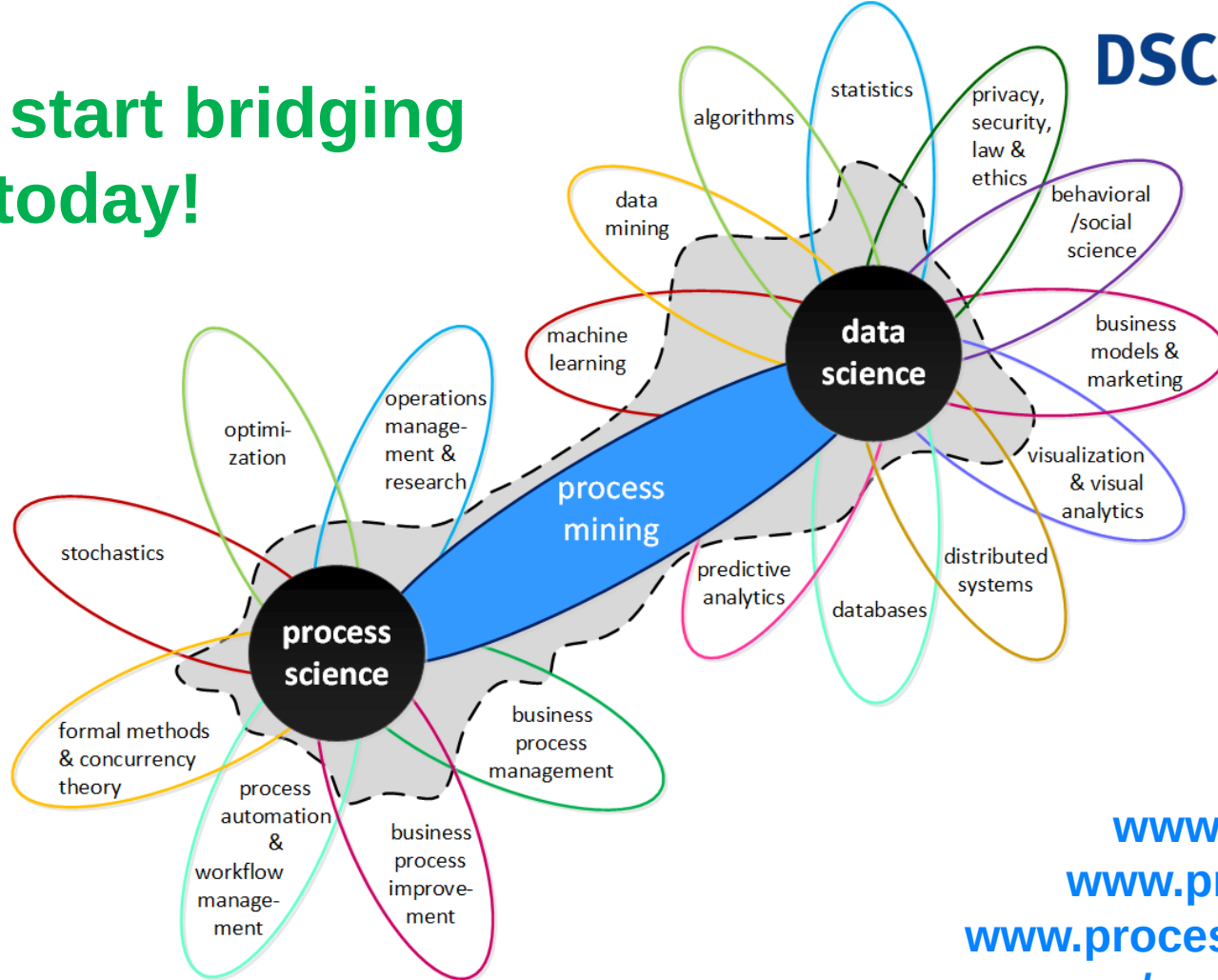
SUBTOTAL				13155.50
9.75% TAX				1282.66

TOTAL				14438.16



Conclusion

You can start bridging the gap today!



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