

Process Mining Tutorial

Goals of this tutorial

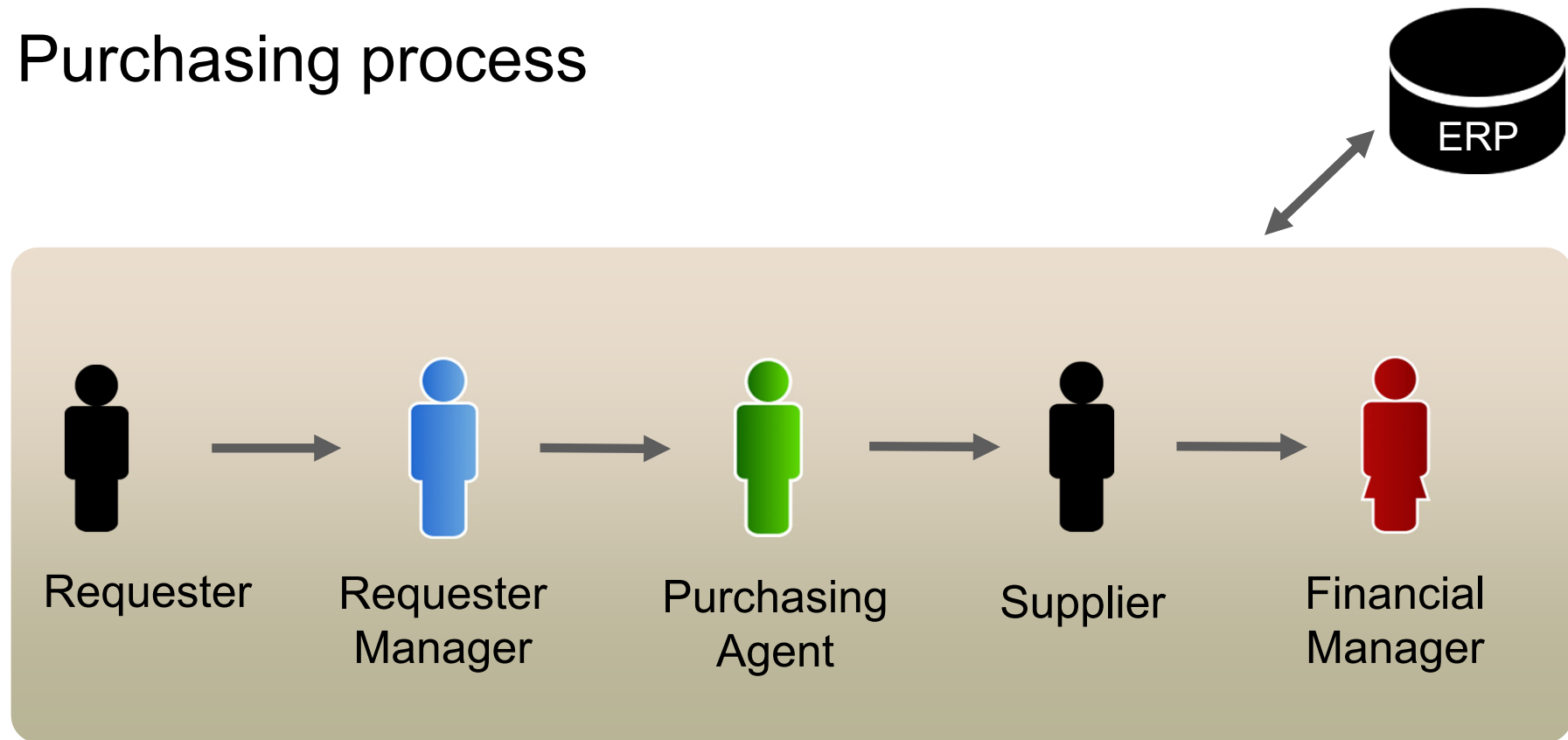
- Understand phases of process mining analysis
- Be able to get started and play around with your own data

Outline

1. **Example Scenario**
2. Roadmap
3. Hands-on Session
4. Take-away Points

Example Scenario

Purchasing process



Problems

1. Inefficient operations
2. Need to demonstrate compliance
3. Complaints about process duration

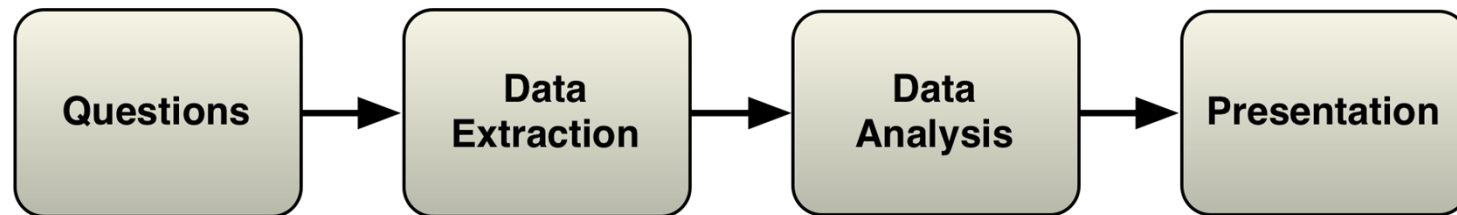
Analysis Goals

1. Understand the process in detail
2. Check whether there are deviations from the payment guidelines
3. Control performance targets (21 days)

Outline

1. Example Scenario
- 2. Roadmap**
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Roadmap



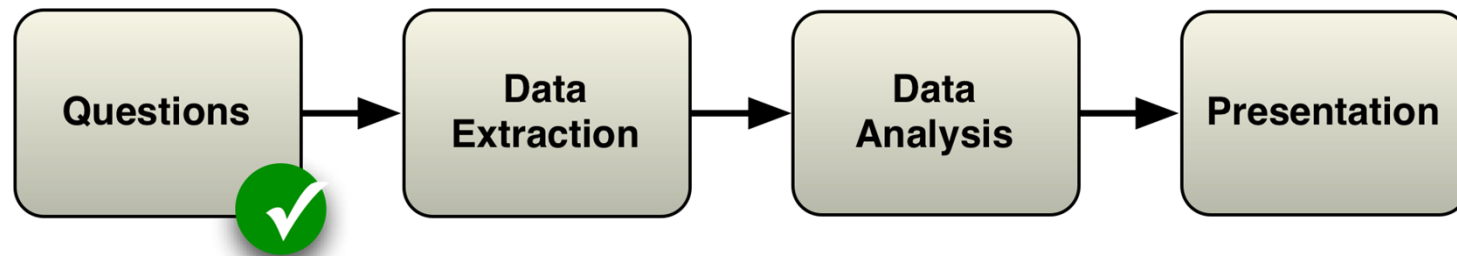
- Determine questions
- Process scope
- Which IT systems

- Via DB administrator
- CSV file or database extract

- Extract 'As-is' process
- Answer questions

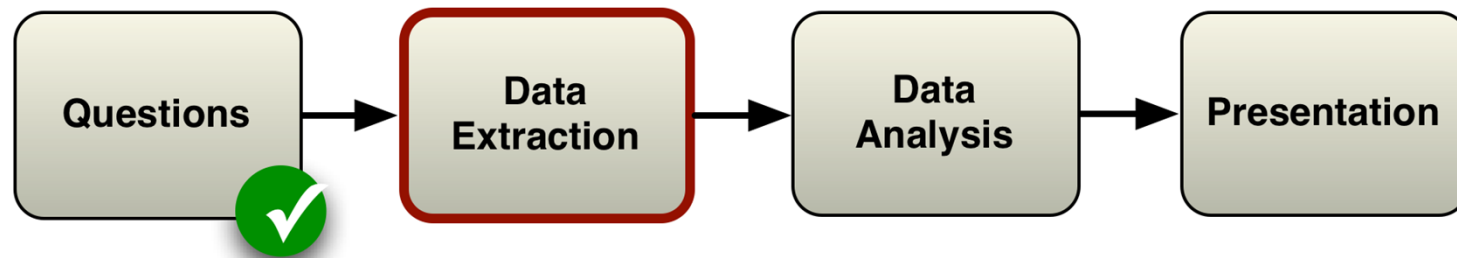
- Present results (e.g., report, presentation, workshop etc.)

Roadmap



1. How does the process actually look like?
2. Are there deviations from the prescribed process?
3. Do we meet the performance targets?

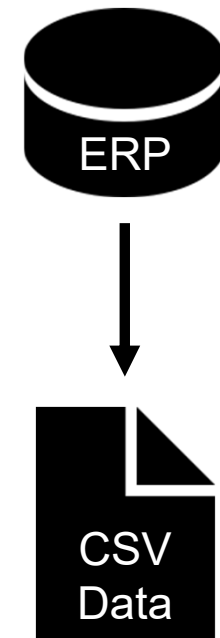
Roadmap



Data Extraction

IT staff extracts history logs from the ERP system

CSV file is starting point for our session



Case ID *Timestamp* *Activity*

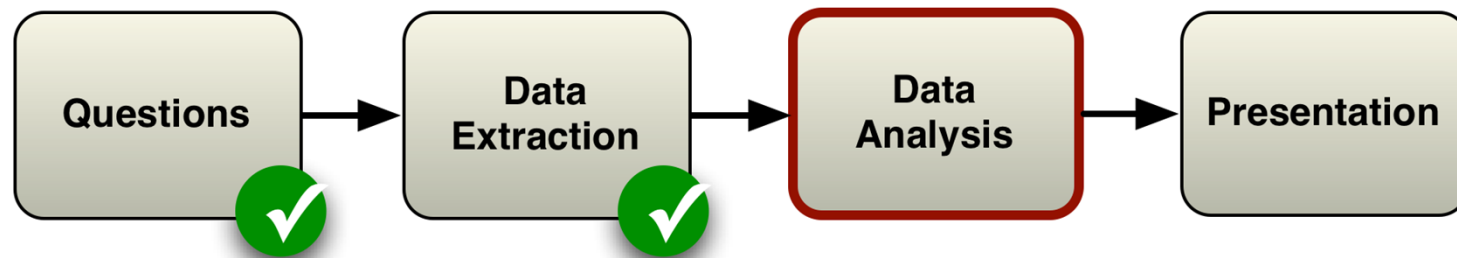
1

3

2

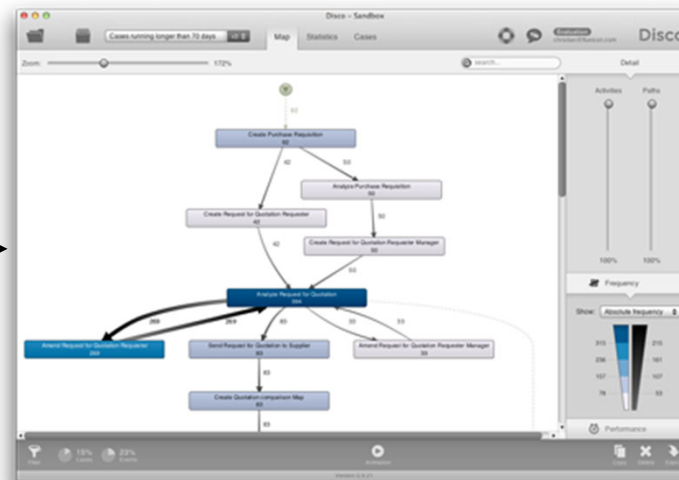
	A	B	C	D	E	F	G
1	CaseID	Timestamp	Medium	Status	Service Line	Urgency	
2	case9700	20.8.09 11:46	Phone	Registered	1st line	0	
3	case9700	20.8.09 11:50	Phone	Completed	1st line	0	
4	case9701	23.9.09 12:23	Phone	Registered	1st line	0	
5	case9701	23.9.09 12:27	Phone	Completed	1st line	0	
6	case9705	20.10.09 14:21	Phone	Registered	Specialist	2	
7	case9705	20.10.09 16:48	Phone	At specialist	Specialist	2	
8	case9705	19.11.09 10:31	Phone	In progress	Specialist	2	
9	case9705	19.11.09 10:32	Phone	Completed	Specialist	2	
10	case3939	15.10.09 11:48	Mail	Registered	Specialist	2	
11	case3939	15.10.09 11:48	Mail	Offered	Specialist	2	
12	case3939	20.10.09 17:18	Mail	In progress	Specialist	2	
13	case3939	20.10.09 17:19	Mail	At specialist	Specialist	2	
14	case3939	21.10.09 14:49	Mail	In progress	Specialist	2	
15	case3939	21.10.09 14:49	Mail	In progress	Specialist	2	
16	case3939	28.10.09 10:17	Mail	In progress	Specialist	2	
17	case3939	28.10.09 10:18	Mail	Completed	Specialist	2	
18	case9704	20.10.09 14:19	Mail	Registered	1st line	0	
19	case9704	20.10.09 14:24	Mail	Completed	1st line	0	
20	case9703	20.10.09 14:40	Phone	Registered	1st line	0	
21	case9703	20.10.09 14:58	Phone	Completed	1st line	0	
22	case9702	24.8.09 12:24	Mail	Registered	2nd line	2	
23	case9702	24.8.09 12:30	Mail	Offered	2nd line	2	
24	case9702	24.8.09 12:31	Mail	Scheduled	2nd line	2	
25	case9702	26.8.09 9:05	Mail	In progress	2nd line	2	
26	case9702	26.8.09 9:19	Mail	Completed	2nd line	2	
27	case9709	20.10.09 14:26	Mail	Registered	Specialist	2	
28	case9700	20.10.09 14:26	Mail	Offered	Specialist	2	

Roadmap



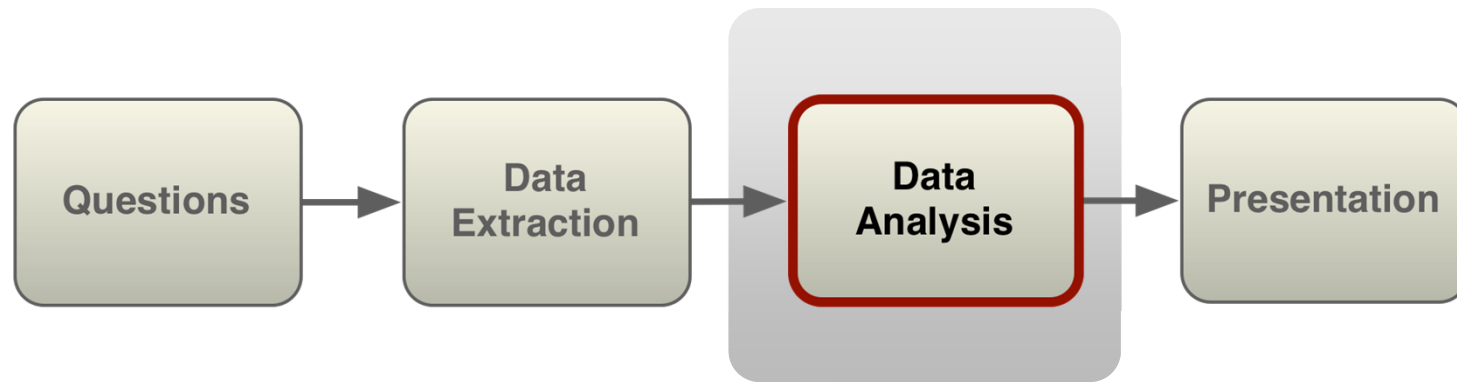
Data Analysis

We use the process mining tool Disco to perform the data analysis



Download from
fluxicon.com/disco

Roadmap



Focus of today's session

Outline

1. Example Scenario
2. Roadmap
- 3. Hands-on Session**
4. Take-away Points

Hands-on Session

Let's get started!



Step 1 - Inspect Data

Open `PurchasingExample.csv` file in Excel and inspect its contents

- Every row corresponds to one event
- You can see information about Case IDs, Activities, Start and end times, Resources, Roles

PurchasingExample.csv

New Open Save Print Import Copy Paste Format Undo Redo AutoSum Sort A-Z Sort Z-A Gallery Toolbox Zoom Help

	A	B	C	D	E	F
	Case ID	Start Timestamp	Complete Timestamp	Activity	Resource	Role
1	1	2011/01/01 00:00:00.000	2011/01/01 00:37:00.000	Create Purchase Requisition	Kim Passa	Requester
2	2	2011/01/01 00:16:00.000	2011/01/01 00:29:00.000	Create Purchase Requisition	Immanuel Karagianni	Requester
3	3	2011/01/01 02:23:00.000	2011/01/01 03:03:00.000	Create Purchase Requisition	Kim Passa	Requester
4	1	2011/01/01 05:37:00.000	2011/01/01 05:45:00.000	Create Request for Quotation	Kim Passa	Requester
5	1	2011/01/01 06:41:00.000	2011/01/01 06:55:00.000	Analyze Request for Quotation	Karel de Groot	Purchasing Agent
6	2	2011/01/01 08:16:00.000	2011/01/01 08:26:00.000	Create Request for Quotation	Alberto Duport	Requester
7	4	2011/01/01 08:39:00.000	2011/01/01 09:00:00.000	Create Purchase Requisition	Fjodor Kowalski	Requester
8	2	2011/01/01 09:34:00.000	2011/01/01 09:38:00.000	Analyze Request for Quotation	Karel de Groot	Purchasing Agent
9	5	2011/01/01 09:49:00.000	2011/01/01 10:35:00.000	Create Purchase Requisition	Esmana Liubiata	Requester
10	2	2011/01/01 10:16:00.000	2011/01/01 10:21:00.000	Amend Request for Quotation	Christian Francois	Requester
11	2	2011/01/01 11:15:00.000	2011/01/01 11:48:00.000	Analyze Request for Quotation	Magdalena Predutta	Purchasing Agent
12	6	2011/01/01 11:20:00.000	2011/01/01 11:37:00.000	Create Purchase Requisition	Christian Francois	Requester
13	1	2011/01/01 11:43:00.000	2011/01/01 12:09:00.000	Send Request for Quotation to Supplier	Karel de Groot	Purchasing Agent
14	1	2011/01/01 12:32:00.000	2011/01/01 16:03:00.000	Create Quotation comparison Map	Magdalena Predutta	Purchasing Agent
15	2	2011/01/01 12:33:00.000	2011/01/01 12:39:00.000	Amend Request for Quotation	Esmana Liubiata	Requester
16	2	2011/01/01 13:28:00.000	2011/01/01 13:38:00.000	Analyze Request for Quotation	Karel de Groot	Purchasing Agent
17	7	2011/01/01 14:05:00.000	2011/01/01 15:00:00.000	Create Purchase Requisition	Esmana Liubiata	Requester
18	8	2011/01/01 14:27:00.000	2011/01/01 15:17:00.000	Create Purchase Requisition	Fjodor Kowalski	Requester
19	2	2011/01/01 15:18:00.000	2011/01/01 15:40:00.000	Send Request for Quotation to Supplier	Francois de Perrier	Purchasing Agent
20	2	2011/01/01 15:55:00.000	2011/01/01 16:43:00.000	Create Quotation comparison Map	Karel de Groot	Purchasing Agent
21	9	2011/01/01 16:17:00.000	2011/01/01 16:34:00.000	Create Purchase Requisition	Tesca Lobes	Requester
22	6	2011/01/01 17:32:00.000	2011/01/01 17:45:00.000	Create Request for Quotation	Alberto Duport	Requester
23	8	2011/01/01 18:00:00.000	2011/01/01 18:07:00.000	Create Request for Quotation	Tesca Lobes	Requester
24	6	2011/01/01 18:39:00.000	2011/01/01 18:55:00.000	Analyze Request for Quotation	Magdalena Predutta	Purchasing Agent
25	4	2011/01/01 18:45:00.000	2011/01/01 18:51:00.000	Analyze Purchase Requisition	Maris Freeman	Requester Manager
26	4	2011/01/01 18:56:00.000	2011/01/01 18:58:00.000	Create Request for Quotation	Heinz Gutschmidt	Requester Manager
27	8	2011/01/01 19:04:00.000	2011/01/01 19:27:00.000	Analyze Request for Quotation	Francois de Perrier	Purchasing Agent
28	6	2011/01/01 19:47:00.000	2011/01/01 19:55:00.000	Amend Request for Quotation	Penn Osterwalder	Requester
29	4	2011/01/01 19:58:00.000	2011/01/01 20:19:00.000	Analyze Request for Quotation	Francois de Perrier	Purchasing Agent
30	8	2011/01/01 20:21:00.000	2011/01/01 20:34:00.000	Amend Request for Quotation	Tesca Lobes	Requester
31	6	2011/01/01 20:55:00.000	2011/01/01 21:28:00.000	Analyze Request for Quotation	Francois de Perrier	Purchasing Agent
32	4	2011/01/01 21:06:00.000	2011/01/01 21:14:00.000	Amend Request for Quotation	Nico Ojenbeer	Requester
33	8	2011/01/01 21:35:00.000	2011/01/01 22:01:00.000	Analyze Request for Quotation	Magdalena Predutta	Purchasing Agent
34	4	2011/01/01 22:01:00.000	2011/01/01 22:24:00.000	Analyze Request for Quotation	Francois de Perrier	Purchasing Agent
35	6	2011/01/01 22:13:00.000	2011/01/01 22:28:00.000	Amend Request for Quotation	Anne Olwada	Requester
36						

PurchasingExample.csv

Normal View Ready Sum=2

Step 2 - Import Data

Load `PurchasingExample.csv` in Disco

Assign columns as follows:

- Case ID → Case ID
- Start and Complete Timestamp → Timestamp
- Activity → Activity
- Resource → Resource
- Role → Other

Click 'Start import'

Disco - Tutorial
Enterprise
anne@fluxicon.com
Disco

Case ID
column is used

	Case ID	Start Timestamp	Complete Timestamp	Activity	Resource	Role
1	1	2011/01/01 00:00:00.000	2011/01/01 00:37:00.000	Create Purchase Requisition	Kim Passa	Requester
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3	3	2011/01/01 02:23:00.000	2011/01/01 03:03:00.000	Create Purchase Requisition	Kim Passa	Requester
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28	6	2011/01/01 19:47:00.000	2011/01/01 19:55:00.000	Amend Request for Quotation	Penn Osterwalder	Requester
29	4	2011/01/01 19:58:00.000	2011/01/01 20:18:00.000	Analyze Request for Quotation	Francois de Perrier	Purchasing Agent

Cancel
File encoding: UTF-8
☒ Use quotes
Ready to start import.
Start import

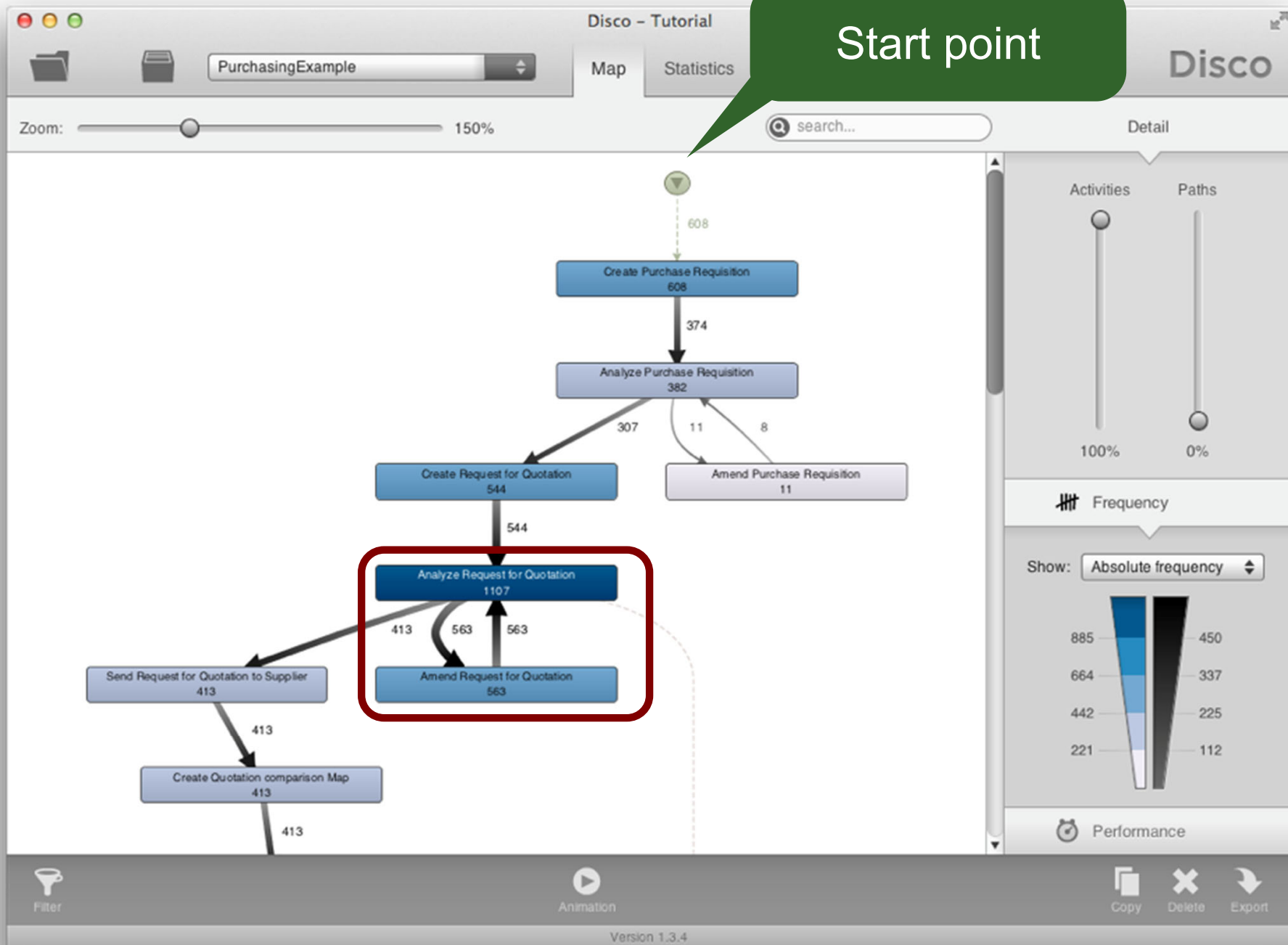
Step 3 - Inspect Process

Look at the resulting process model

- Numbers in rectangles are activity frequencies
- Number at arcs is frequency of connection

→ You see the main process flows

- All 608 cases start with activity 'Create Purchase Requisition'
- Lots of changes were made (amendments)!

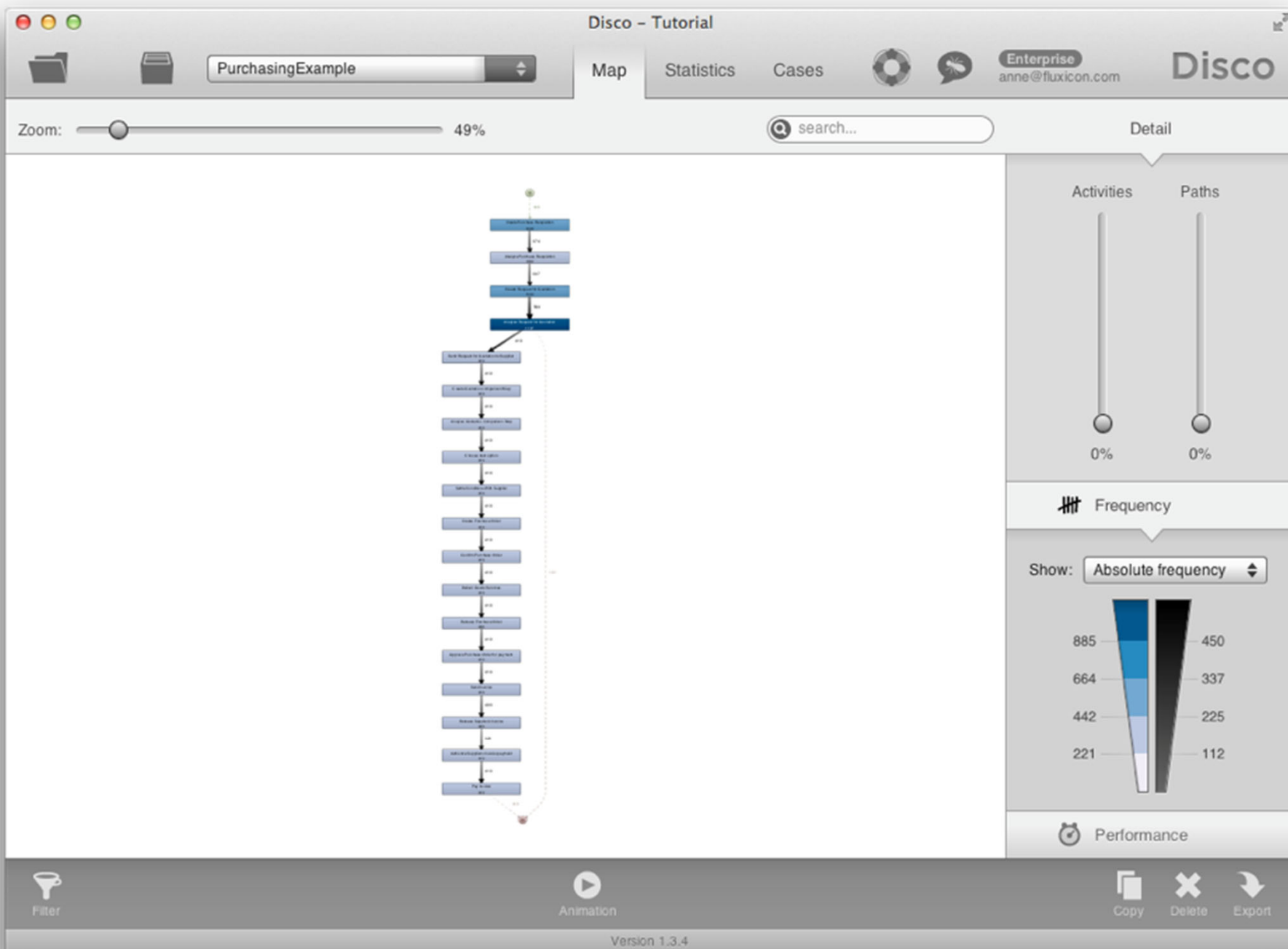


Step 3 - Inspect Process

It's important to be able to adjust the level of detail for the process map

Move up the 'Activities' slider down to lowest position (0%)

- Only the activities from the most frequent process variant are shown

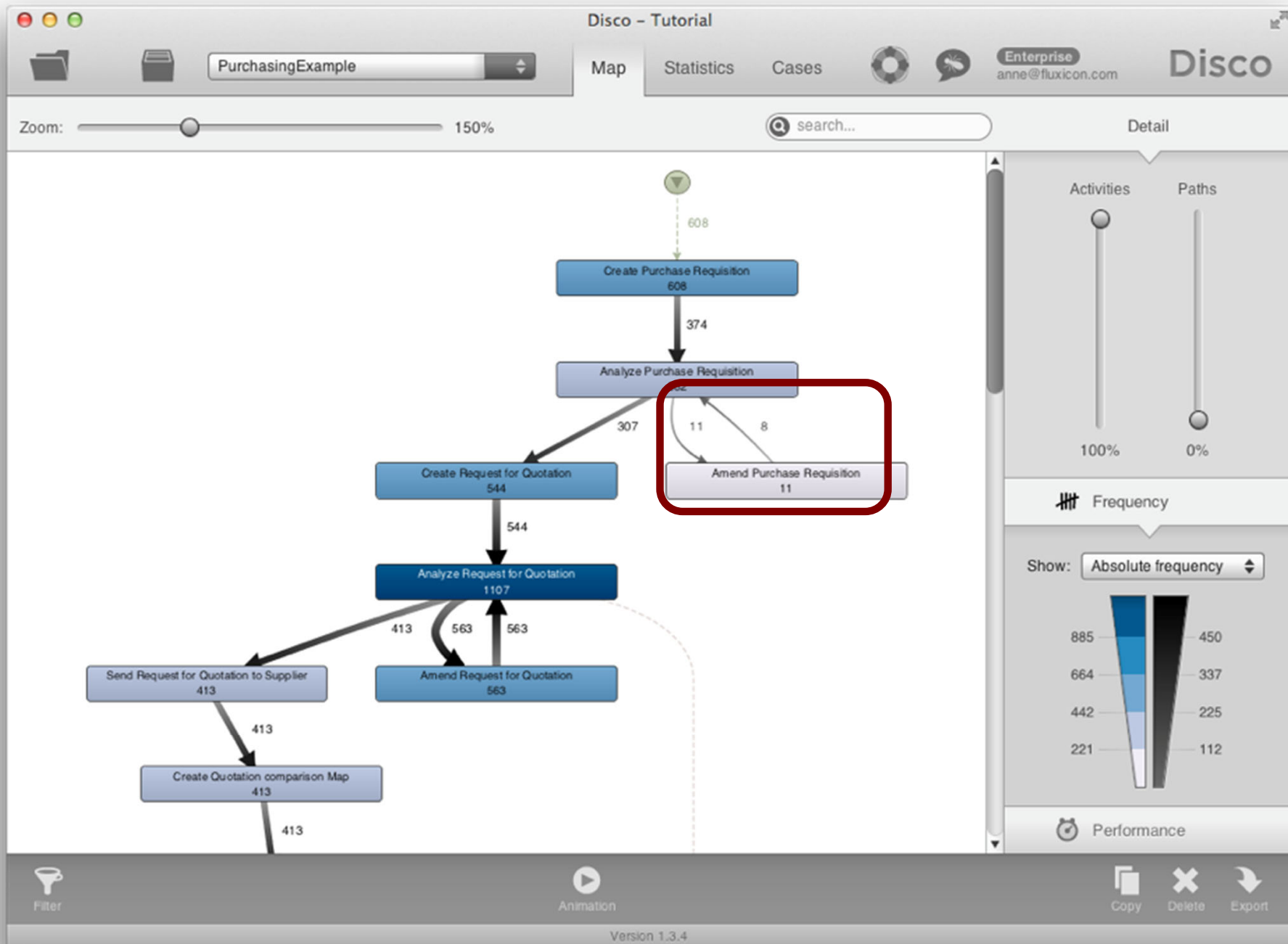


Step 3 - Inspect Process

Gradually move the 'Activities' slider up to 100% again until all activities are shown

- Even infrequent activities such as 'Amend Purchase Requisition' are shown

You'll notice that 11 cases are flowing in to 'Amend Purchase Requisition' but only 8 are moving out - Where are the other 3?

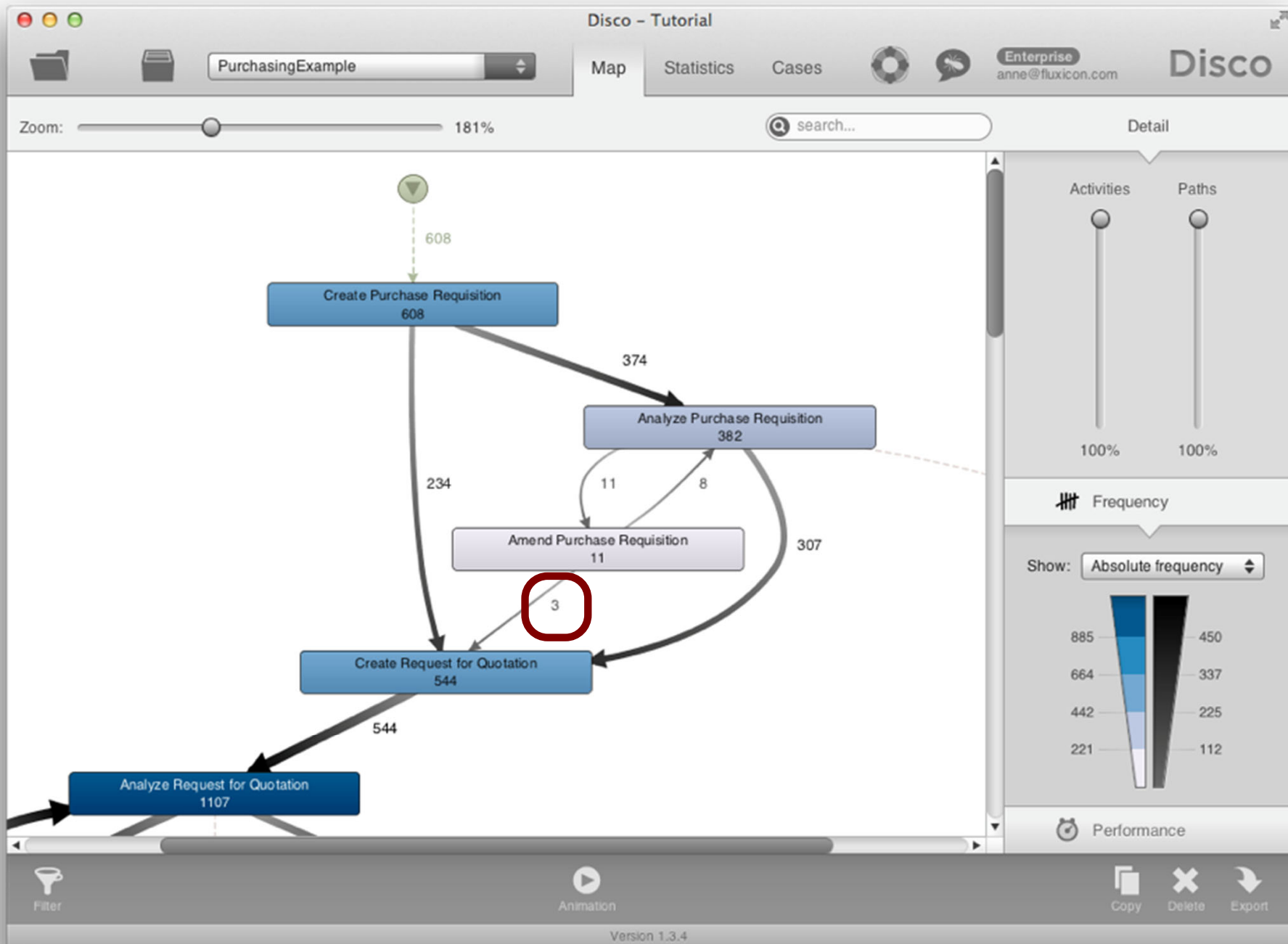


Step 3 - Inspect Process

Move up the 'Paths' slider up to the top

You now see a 100% detailed picture of the executed process

- The 3 missing cases move from 'Amend Purchase Requisition' to 'Create Request for Quotation'

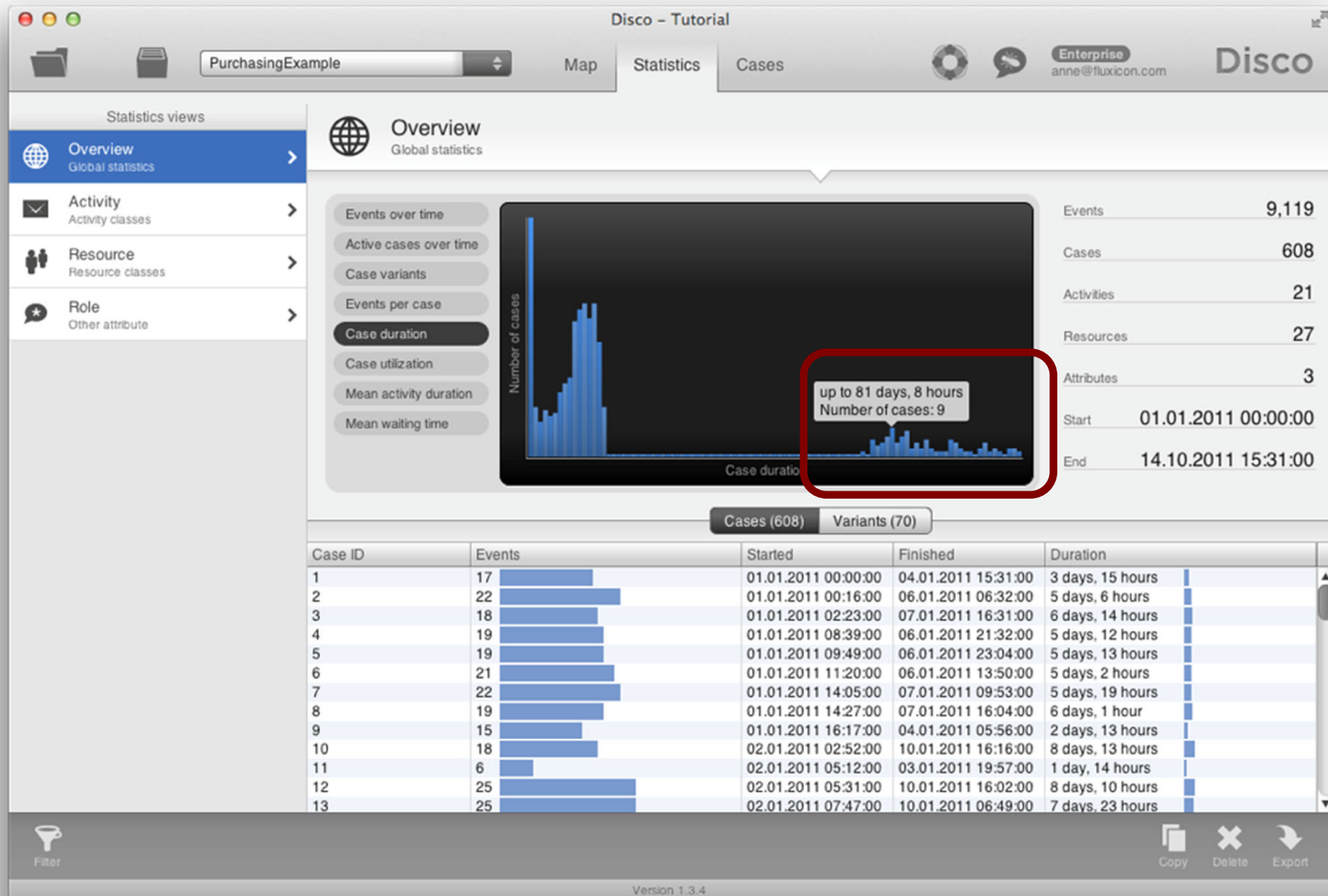


Step 4 - Inspect Statistics

Look at 'Statistics' tab to see overview information about event log

- 9,119 events were recorded for 608 cases
- Timeframe is January - October 2011

The case duration is typically up to 15 or 16 days, but some cases take very long (more than 70 or 80 days!)



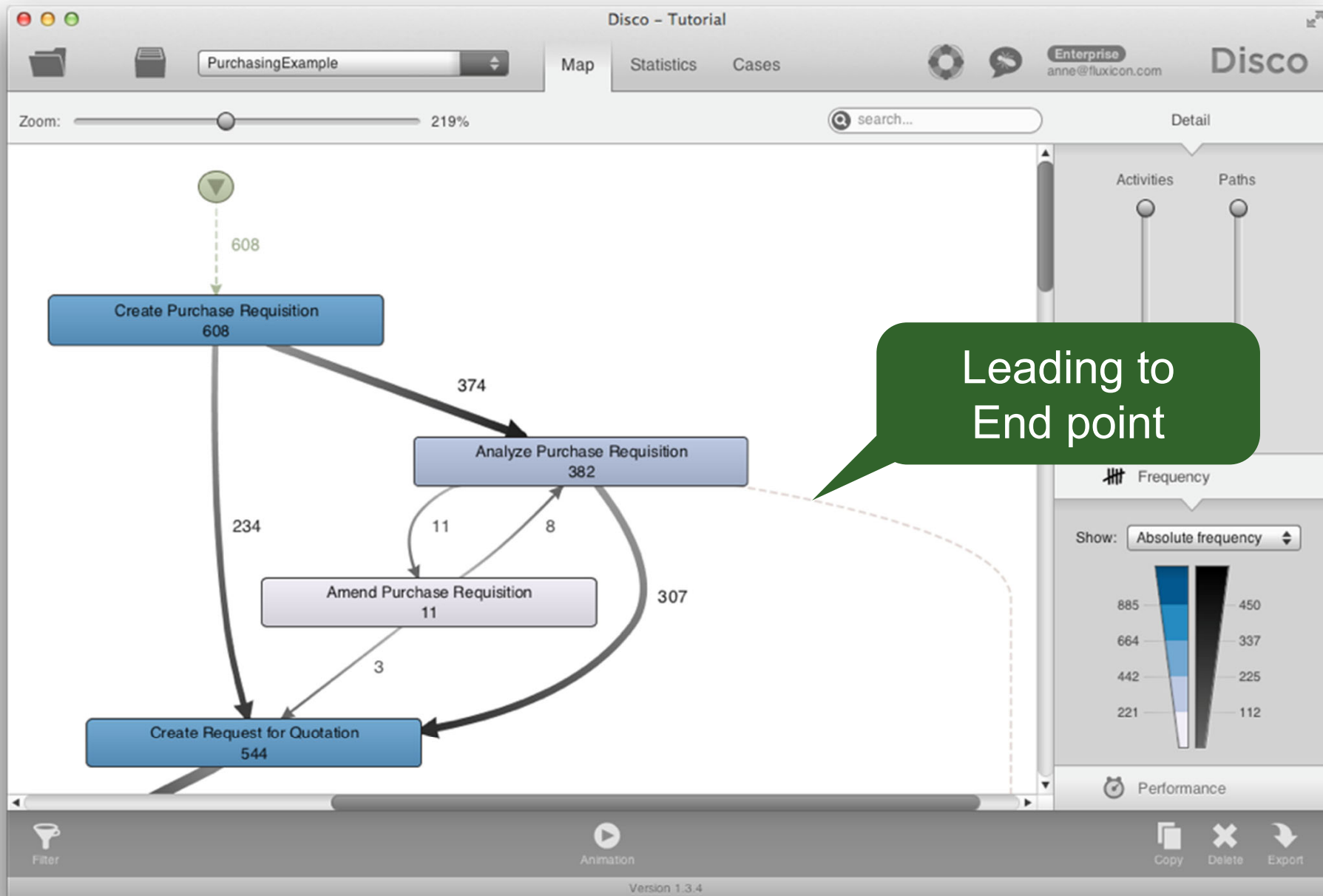
Step 5 - Inspect Cases

Select 'Cases' tab to inspect variants and individual service instances

- The third most frequent process variant ends after 'Analyze Purchase Requisition' (ca. 10.36% of all cases follow this pattern)

→ Why are so many requests stopped? Do people not know what they can buy? (We can find this back in the process map, too)





Results so far...

Original Questions:

- ✓ 1. How does the process actually look like?
 - Objective process map discovered
 - Lots of amendments and stopped requests: **Update of purchasing guidelines needed**
2. Are there deviations from the prescribed process?
3. Do we meet the performance targets?
 - Not by all (some take longer than 21 days):
Where in the process do we lose the time? -> Next