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bpi³ provides 'smart' business performance improvement exploration and monitoring services.

Our service range:

•Business Performance Advisory.
•Business Improvement Monitoring.
•Business Teams Assessment.

Our approach is based on using our data and process analysis approach supported by innovative tooling.

web: www.bpi3.com
e-Mail: info@bpi3.com
Phone : +32 11 76 36 83

Administrative address:
Fruitmarkt 8/1
3500 Hasselt

Intervention Management Use Case

Process mining in support of operational excellence and sales.

The Risk Matrix

The Challenge: Security Services companies are caught between the rising costs of operations and the downward price pressure due to direct and indirect competition. Further improvements in operational excellence together with service innovation are key in addressing these challenges.

A process and data mining project was conducted in the beginning of 2013 together with Risk Matrix Resultans to determine a reference base

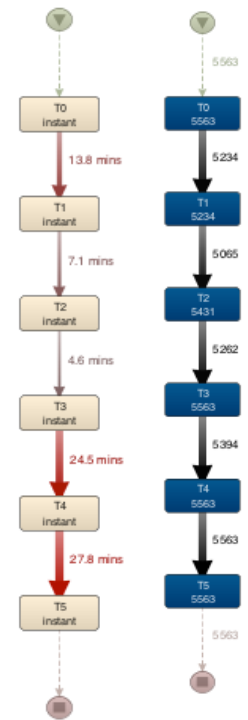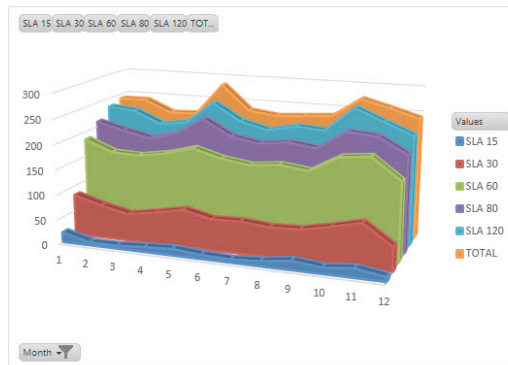| SLA ANALYSIS						
Project: CLIENT	Level of SLA reached (Cumulative)					
Date: 15/3/2013						
Months 2012	SLA 15	SLA 30	SLA 60	SLA 80	SLA 120	TOTAL
1	20	82	185	211	233	241
2	6	66	163	197	228	242
3	6	54	161	185	204	218
4	10	64	170	200	211	220
5	13	75	185	233	256	284
6	8	62	169	202	222	234
7	6	64	161	192	208	227
8	10	59	167	199	220	231
9	18	61	160	192	216	235
10	12	73	192	229	265	273
11	18	87	198	224	241	258
12	9	47	156	193	218	241
Grand Total	136	794	2067	2457	2722	2904

Fig 1: Frequency and Time based analysis

of time-based KPI values for the optimization of the actual service offerings and potential new service packages. The data were further used as input for a predictive model of work force location and capacity planning.

Service delivery is always managed via agreements in the form of contractual obligations based on target performance. Not reaching pre-set targets has immediate financial implications. The service provider therefore actively manages these agreements in order to deliver the services efficiently with costs/penalties managed in relation to the individual client expectation and priorities between clients.

Determine the actual base level KPI values of the intervention services process execution.

• Understand the current state of the practice in process execution conformance and throughput. Address bottlenecks and outliers.
• Prepare for a predictive model and estimate the impact of winning/losing clients.
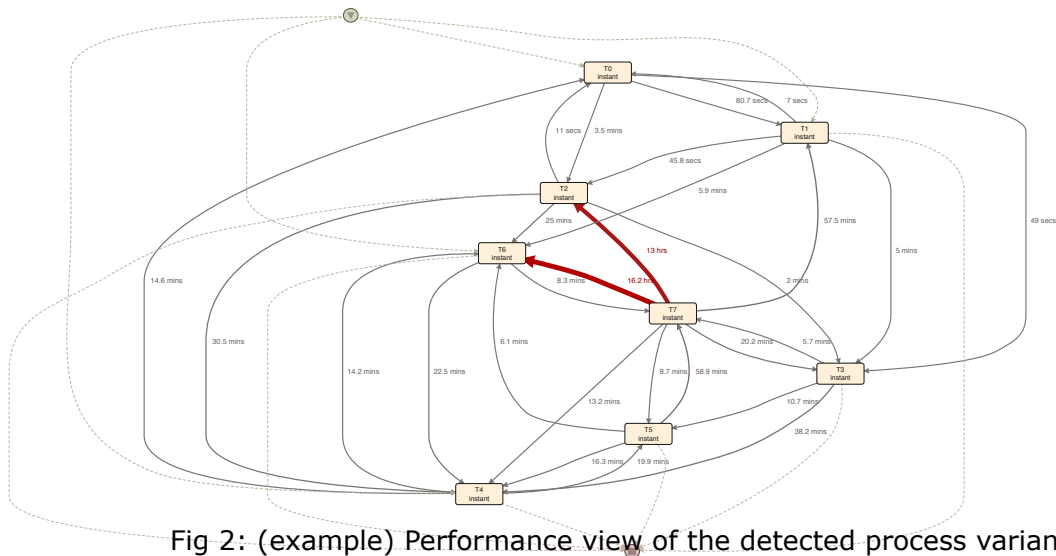
Fig 2: (example) Performance view of the detected process variants

Service processes performance measurement and base level performance KPI deduction is difficult without special analytic approach (process mining tooling). Service process execution is registered by service desk software. The registration process is both machine and people driven. Experience learns that service registration and management is subject to involuntary and voluntary errors.

The Case. The data for this project were extracted from the service delivery monitoring system build-for-purpose by Risk Matrix Resultants (RMR) for security service providers. The anonymized event log held data over a period of 2 years containing all interventions for all clients. The dataset contained over 50.000 cases (missions) and 400.000 events. Before import into the process discovery software the data where enhanced /cleaned for missing data and the elimination of very extreme outliers (about 20 cases)

The service process has 2 stages. The first stage starts with a client intervention service request (T0) followed by the execution of a workflow of 3 steps by the dispatching unit covering the confirmation of the activation of the service request (T1), the identification of an available agent (T2) and confirmation by the agent of acceptance of the mission (T3). The second stage is the intervention itself. The execution of the intervention holds 4 subsequent steps. Effective departure to the location for the intervention (T4), Arrival at the location and start of the observations (T5), End of the Observation and documenting the intervention (T6). End of Mission (T7). The straight through process holds 7 steps (70% of the cases). 5 possible process variants exist. Using the Automatic Process Detection (ADP) software Disco from Fluxicon, the real process flows (conformance check) were visualized and analyzed with calculation of average, total, minimum and maximum timing (performance check) between process steps. 4 time-based KPI's are of interest the major one being T0-T5. The others are T0-T1, T3-T5 and ultimately T0-T7.

Discoveries. Roadblocks. Usage of the APD software allowed us to visualize real process execution together with first performance indications.

Analyses showed the occurrence of over 100 process variants where the expectation is 5 process variants. Analyzing the case variants showed that a range of cases were affected by 'Clock Drift'. Clock drift observation can occur for the transactions generated by the hand-held devices (PDA's) used by the field

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service agents or between the alarm generating system (T0) and the dispatching /intervention management system (T1). When the system clocks of devices are not synchronized, the recorded time stamps can shift with seconds, even minutes influencing the effective SLA timings. Using the case monitoring capacity of disco and process filtering and analysis techniques we are able to visualize outliers quickly and prepare corrections to the transaction file compensating the irregular observations. We suppressed or eliminated the most prominent outliers from the 'final' process mining file (about 100 Cases).

Other targeted process discoveries (observations) were:
- ‣ priority accounts treatment,
- ‣ work handover patterns (preferential treatment of agents),
- ‣ correct treatment of the intervention priority classes.

Since we want to measure performance KPI's between process steps and across sequences of process steps in the range of 15 tot 120 Mins, the on screen visualization was not accurate enough. We have the possibility to measure performance in seconds by exporting the (filtered) detail measurement data out
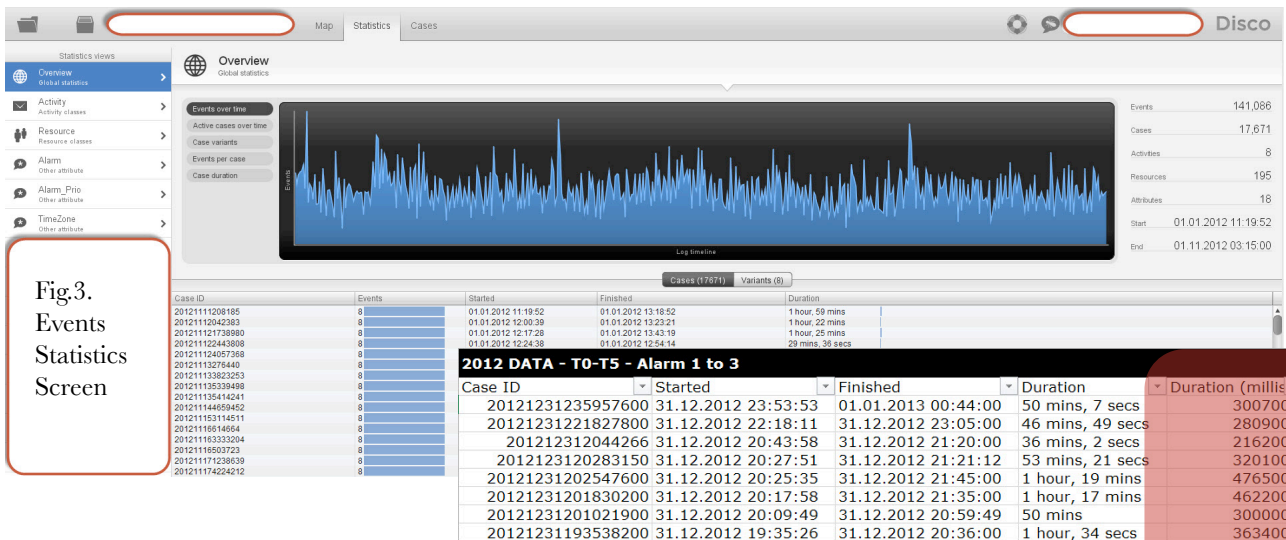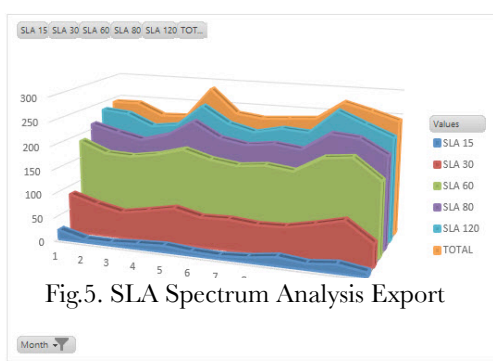

Fig.3. Events Statistics Screen

2012 DATA - T0-T5 - Alarm 1 to 3

Case ID	Started	Finished	Duration	Duration (millis)
20121231235957600	31.12.2012 23:53:53	01.01.2013 00:44:00	50 mins, 7 secs	3007000
20121231221827800	31.12.2012 22:18:11	31.12.2012 23:05:00	46 mins, 49 secs	2809000
201212312044266	31.12.2012 20:43:58	31.12.2012 21:20:00	36 mins, 2 secs	2162000
2012123120283150	31.12.2012 20:27:51	31.12.2012 21:21:12	53 mins, 21 secs	3201000
20121231202547600	31.12.2012 20:25:35	31.12.2012 21:45:00	1 hour, 19 mins	4765000
20121231201830200	31.12.2012 20:17:58	31.12.2012 21:35:00	1 hour, 17 mins	4622000
20121231201021900	31.12.2012 20:09:49	31.12.2012 20:59:49	50 mins	3000000
20121231193538200	31.12.2012 19:35:26	31.12.2012 20:36:00	1 hour, 34 secs	3634000
39370	31.12.2012 08:35:26	31.12.2012 09:04:09	28 mins, 43 secs	1723000
22500	30.12.2012 22:12:59	30.12.2012 22:55:10	42 mins, 11 secs	2531000
24600	30.12.2012 17:18:48	30.12.2012 1	Fig.4. Data Export	1912000
51400	30.12.2012 13:36:35	30.12.2012 1		2894000
51680	30.12.2012 07:31:37	30.12.2012 08:42:07	1 hour, 10 mins	4230000
20930	30.12.2012 00:47:43	30.12.2012 04:13:56	3 hours, 26 mins	12373000
47900	29.12.2012 23:50:19	30.12.2012 01:05:00	1 hour, 14 mins	4481000
56160	29.12.2012 18:08:35	29.12.2012 18:29:56	21 mins, 21 secs	1281000

Fig.4. Data Export

SLA ANALYSIS

Project: CLIENT Level of SLA reached (Cumulative)
Date: 15/3/2013

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of the Disco tool for subsequent analysis.

Fig 3. shows the Disco "Case" statistics screen, from which we exported the data out of the APD environment (uniformly in microseconds) for further SLA analysis (Fig4). A template based Tableau Software Visualization supported the production of a cumulative SLA spectrum, or range, analysis. (Fig.5) shows the SLA category of the individual project performances.

Fig.5. SLA Spectrum Analysis Export

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Service Level Performance Range Testing. We use the process discovery software build-in filtering possibilities to make process group selections for targeted performance analysis. The processes sequences of interest are T0->T5, T0->T1 linked with financial compensation. For cost optimization and predictive analytics the process sequences T3->T5, T0->T7 were analyzed. We also filtered-out group of clients with similar or different execution patterns based on type of service contract.

Service Level Performance Full Detail Testing. To prepare for detailed step by step performance calculations we use the process discovery build in filtering possibilities to make process group selections and gliding window analysis.

The selections made were: individual client and groups of clients, a particular service type or range of service types, priorities, time period.

Benefits.

- Insight in the process variants helped to focus the communication to the operations teams for more accurate recording of the activities.
- Both, conformance and performance, analysis showed immediate money on the table (value leakage).
- The provided insight is instrumental input for business strategy and tactics corrections such as adaptations in client segmentation (priority services) and the possibility for more granular time based SLA service pricing.
- More accurate information for better planning. Recommendation for geolocation based research. Process Steps T3->T5 is the critical path in reaching target SLA's.
- More and better information in preparation and planning for client acquisition tactics. The analysis are used in pre-sales and sales campaigns.

Evolutions. bpi3 is continuous working towards more accurate and more diverse analysis for both Service Level Assurance and ongoing SLA monitoring.

- We developed techniques for concept drift testing. Detecting (positive or negative) changes in process execution over the different measurement periods. This in support of the interpretation of the time bound SLA's evolution being the basis for financial reward/penalty reporting.
- The obtained data analytics provide the needed input for testing the design of predictive models for capacity planning of the required resources.
- Data input for SLA reporting using gliding windows.

Contact :
walter.vanherle@bpi3.com
+32 497 59 6 26