Your Knowledge Partner ™

Flight Safety Data Analysis with PolyAnalyst™

Case study

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Disclaimer

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Overview of Application

Aviation safety experts surmise that accidents are usually a culmination of a series of unsafe events that had gone unnoticed. For every accident and major event report that is thoroughly investigated, there can be 300 incident reports (Heinrich's triangle) that could have contained information about the impending accident. These reports can be in the form of pilot reports, maintenance reports or incident reports at different parts of Flight Operations. Incident reports represent a combination of structured data and free form text narratives stored in a database. The analysis of these reports is carried out is predominantly manually so far.

PolyAnalyst™ is a comprehensive and user-friendly data and text mining system. It offers a complete end-to-end data analysis solution - from data importing, cleaning and manipulation, to visualization, modeling, scoring and reporting. *PolyAnalyst* can access data stored in any major commercial database and some proprietary data formats (Excel, SAS), as well as popular document formats. It offers a broad selection of semantic text analysis, clustering, prediction, and classification algorithms, link analysis, transaction analysis, and powerful visualization capabilities. PolyAnalyst can be a convenient solution for easy, thorough and accurate analysis of aviation safety data.

Results obtained with PolyAnalyst provide key insights into happenings in different aviation processes, helping safety officers to

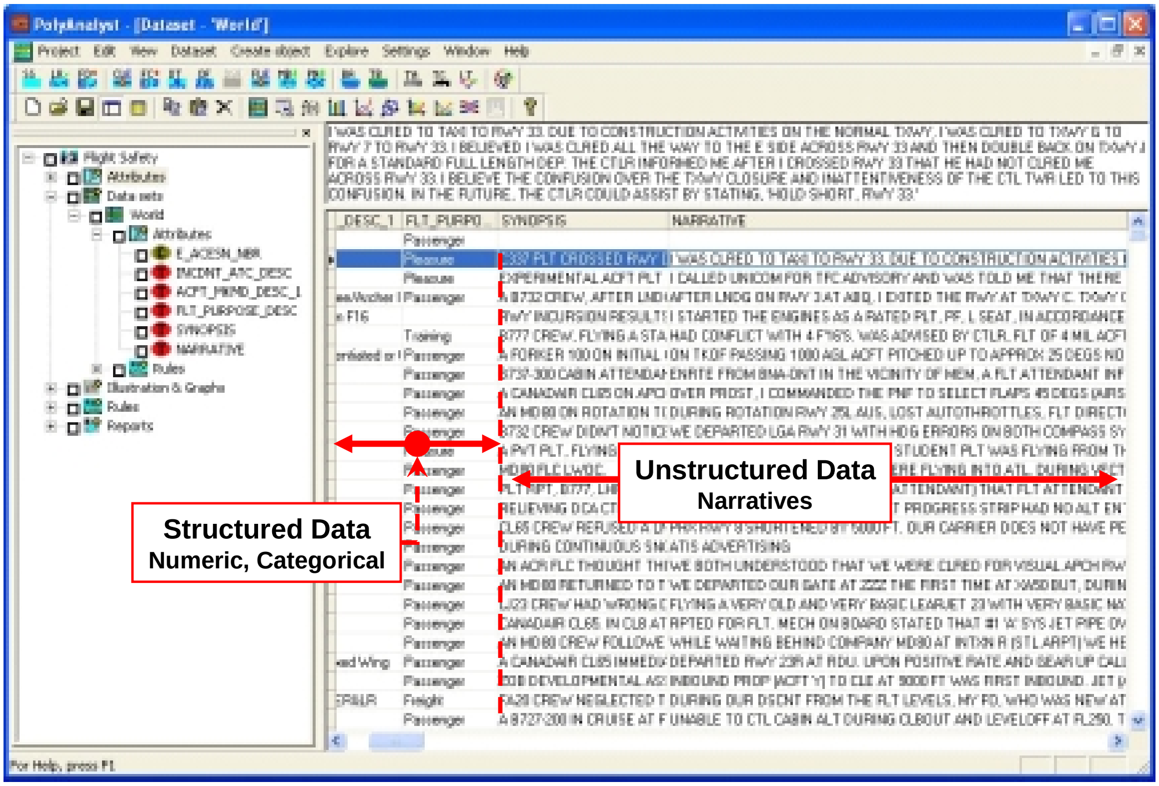
a) Reveal hidden problem issues (irrespective of data type – structured or unstructured)
b) Generate strategic overview charts for the management across different parameters
c) Identify bottlenecks in processes and highlight quality / supplier related issues

This case illustrates how PolyAnalyst can be applied for the analysis of safety databases containing data in both structured and narrative formats and how it can expedite the process of identifying hidden trouble spots to help improve aviation safety.

Input Data

The Aviation Safety Reporting System (ASRS) receives, processes, and analyzes reports of unsafe occurrences and hazardous situations that are voluntarily submitted by pilots, air traffic controllers, and others. PolyAnalyst has been applied to analyzing ASRS data from NASDAC. The chosen period covered October and November of 2001 and included 7,500 records and 61 attributes (including free form text in narrative fields).

The data was imported in PolyAnalyst using a built-in Data Import Wizard. To ensure the most explicit interpretation of the results obtained from free text fields, user-made dictionaries of domain-specific synonyms, stop-words and abbreviation expansions were also imported in the system.



I WAS CLRED TO TAXI TO RWY 33 DUE TO CONSTRUCTION ACTIVITIES ON THE NORMAL TXWY. I WAS CLRED TO TXWY G TO RWY 7 TO RWY 33. I BELIEVED I WAS CLRED ALL THE WAY TO THE E SIDE ACROSS RWY 33 AND THEN DOUBLE BACK ON TXWY J FOR A STANDARD FULL LENGTH DEP. THE CTLR INFORMED ME AFTER I CROSSED RWY 33 THAT HE HAD NOT CLRED ME ACROSS RWY 33. I BELIEVE THE CONFUSION OVER THE TXWY CLOSURE AND INATTENTIVENESS OF THE CTL TWR LED TO THIS CONFUSION. IN THE FUTURE, THE CTLR COULD ASSIST BY STATING, 'HOLD SHORT, RWY 33.'

_DESC_1	FLT_PURPO	SYNOPSIS	NARRATIVE
	Passenger		
	Pleasure	B737 PLT CROSSED RWY	I WAS CLRED TO TAXI TO RWY 33 DUE TO CONSTRUCTION ACTIVITIES I
	Pleasure	EXPERIMENTAL ACFT PLT	I CALLED UNICOM FOR TFC ADVISORY AND WAS TOLD ME THAT THERE
ee/Ancher I	Passenger	A B732 CREW, AFTER LNDI	AFTER LNDG ON RWY 3 AT ABQ, I EXITED THE RWY AT TXWY C. TXWY C
a F16		RWY INCURSION RESULTS	I STARTED THE ENGINES AS A RATED PLT, PF, L SEAT, IN ACCORDANCE
	Training	B777 CREW, FLYING A STA	HAD CONFLICT WITH 4 F16'S. WAS ADVISED BY CTLR. FLT OF 4 MIL ACFT
ontinated or I	Passenger	A FOKKER 100 ON INITIAL	ON TKOF PASSING 1000 AGL ACFT PITCHED UP TO APPROX 25 DEGS NO
	Passenger	B737-300 CABIN ATTENDAN	ENRTE FROM BNA-DTW IN THE VICINITY OF HEM, A FLT ATTENDANT INF
	Passenger	A CANADAIR CL65 ON APCH	OVER PRDST, I COMMANDED THE PNF TO SELECT FLAPS 45 DEGS (AIRS
	Passenger	AN MD80 ON ROTATION TO	DURING ROTATION RWY 28L AUS, LOST AUTOTHROTTLES, FLT DIRECT
	Passenger	B732 CREW DIDN'T NOTICE	WE DEPARTED LGA RWY 31 WITH HDG ERRORS ON BOTH COMPASS SY
	Pleasure	A PVT PLT, FLYING	STUDENT PLT WAS FLYING FROM TH
	Passenger	MD80 FLC LWDE	ERE FLYING INTO ATL. DURING VECT
	Passenger	PLT RPT, B777, LHR	ATTENDANT) THAT FLT ATTENDANT
	Passenger	RELIEVING DCA CT	T PROGRESS STRIP HAD NO ALT ENT
	Passenger	CL65 CREW REFUSED A LP	PAK RWY 8 SHORTENED BY 5000FT. OUR CARRIER DOES NOT HAVE PE
	Passenger	DURING CONTINUOUS 5 MI	ATIS ADVERTISING
	Passenger	AN ACR FLC THOUGHT THE	WE BOTH UNDERSTOOD THAT WE WERE CLRED FOR VISUAL APCH RW
	Passenger	AN MD80 RETURNED TO T	WE DEPARTED OUR GATE AT 2222 THE FIRST TIME AT XX50 BUT, DURIN
	Passenger	LJ23 CREW HAD WRONG	FLYING A VERY OLD AND VERY BASIC LEARJET 23 WITH VERY BASIC NA
	Passenger	CANADAIR CL65. IN CLB AT	RPTED FOR FLT. MECH ON BOARD STATED THAT #1 'A' SYS JET PIPE OV
	Passenger	AN MD80 CREW FOLLOWE	WHILE WAITING BEHIND COMPANY MD80 AT INTXN R (STL ARPT) WE HE
ed Wing	Passenger	A CANADAIR CL65 IMMEDIA	DEPARTED RWY 23R AT RDU. UPON POSITIVE RATE AND GEAR UP CALL
	Passenger	E08 DEVELOPMENTAL AS	INBOUND PROP (ACFT Y) TO CLE AT 9000 FT WAS FIRST INBOUND. JET (
SR&LR	Freight	FA20 CREW NEGLECTED T	DURING OUR DSCNT FROM THE FLT LEVELS, MY FO, WHO WAS NEW AT
	Passenger	A B727-200 IN CRUISE AT F	UNABLE TO CTL CABIN ALT DURING CLBOUT AND LEVELOFF AT FL290. T

Fig. 0. Snapshot of the investigated data.

PolyAnalyst can directly access data from any major commercial database through standard OLE DB and ODBC protocols. Fig. 1 shows the data as it appears after importing into the system. The data contains both structured and narrative fields.

Analytical Process

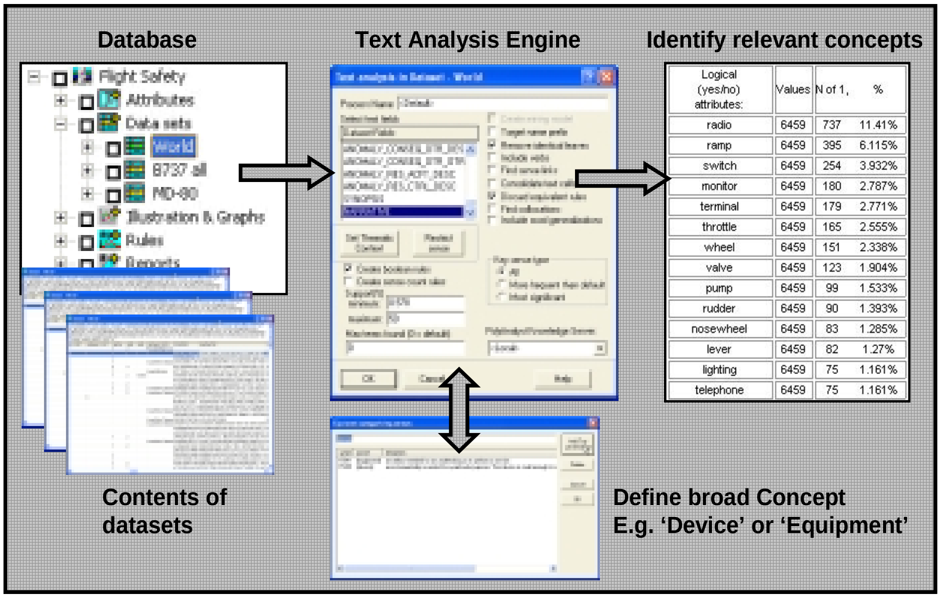
PolyAnalyst provides a comprehensive set of tools that can address many analytical tasks that safety officers are facing and can be easily fine-tuned to a specific application domain. A major portion of the user's involvement is in providing direction to the analysis process and defining their areas of interest. User-defined parameters for running analysis engines are entered in the corresponding dialog boxes.

Broadly, the process of gaining knowledge from narratives would involve two main steps: extraction and interpretation of knowledge. Further discussion will primarily concentrate on the analysis of unstructured portion of the data, as it often contains over 80% of useful information, while analysts lack efficient tools for the analysis of textual notes.

a) Identify and extract all terms of interest occurring in narratives

Fig. 2 illustrates simple steps performed by the user to run the PolyAnalyst Text Analysis (TA) engine to identify important concepts being discussed in the narratives. Text analysis can be carried out in two modes:

- Unsupervised TA Mode: In this mode, the TA engine extracts all important concepts occurring in the text.
- Supervised TA Mode: The user can guide the TA engine to only search and extract concepts of interest to them. For example, by defining the broad concept '*equipment*' the system can return a list of all equipment or device results like '*radar*', '*horn*', '*pump*' and '*rudder*' that have been discussed in the narrative.



Logical (yes/no) attributes:	Values	N of 1,	%
radio	6459	737	11.41%
ramp	6459	395	6.115%
switch	6459	254	3.932%
monitor	6459	180	2.787%
terminal	6459	179	2.771%
throttle	6459	165	2.555%
wheel	6459	151	2.338%
valve	6459	123	1.904%
pump	6459	99	1.533%
rudder	6459	90	1.393%
nosewheel	6459	83	1.285%
lever	6459	82	1.27%
lighting	6459	75	1.161%
telephone	6459	75	1.161%

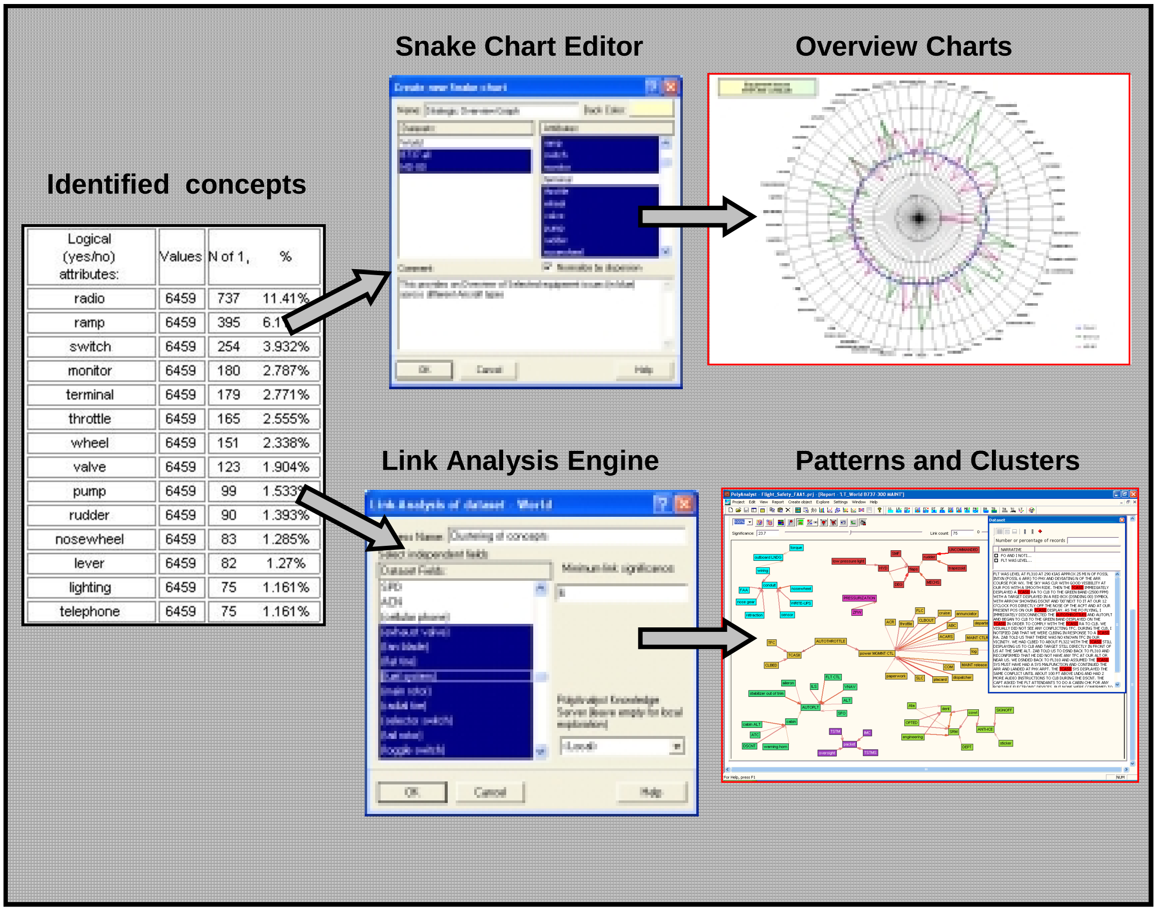
Fig. 2. Automated text analysis exploration.

Once the main terms are extracted, the user becomes able to either simply export the concepts to a Microsoft Excel sheet or conduct other advanced analysis and visualization within PolyAnalyst.

b) Generate actionable reports for Management

The system incorporates different visualization techniques to enable the user generate explicit and actionable results. Fig. 3 illustrates two visualizations graphs the user can employ to better understand patterns of terms and relations between them that had been identified in the previous step.

The Snake Chart is utilized for providing a comparative overview of concepts across different business entities. The Link Terms engine conducts 'n-dimensional' correlation analysis and visual layout of the results to help reveal close associations and patterns of terms in the investigated data.


Snake Chart Editor
Overview Charts
Identified concepts
Link Analysis Engine
Patterns and Clusters
Create new Snake chart
OK
Cancel
Help
Link Analysis of dataset - World
Class Name: Clustering of concepts
Select independent fields
Dataset Fields:
Minimum link significance
PolyAnalyst Knowledge Server (leave empty for local exploration)
<Local>

Logical (yes/no) attributes:	Values	N of 1,	%
radio	6459	737	11.41%
ramp	6459	395	6.1
switch	6459	254	3.932%
monitor	6459	180	2.787%
terminal	6459	179	2.771%
throttle	6459	165	2.555%
wheel	6459	151	2.338%
valve	6459	123	1.904%
pump	6459	99	1.533
rudder	6459	90	1.393%
nosewheel	6459	83	1.285%
lever	6459	82	1.27%
lighting	6459	75	1.161%
telephone	6459	75	1.161%

Fig. 3. Possible steps of typical data analysis scenarios.

In addition to the above two processes, PolyAnalyst provides numerous other analysis and visualization capabilities and scenarios based on the needs and desires of the analyst. Overall, it offers sixteen different analytical engines and a few dozen visualization techniques that can be used either independently or sequentially to derive new knowledge from data. This broad range of analytical engines also allows the user to conduct the analysis irrespective of the type of data (Numeric, Boolean, Categorical or Textual).

Tool's Output

1) Intelligent Text Analysis

Flight Safety Officers (FSO) would like to quickly learn major concerns as perceived by the pilots. Of course, one can try to extract all text concepts occurring in the narratives and then manually browse through them. However, a far more powerful mechanism would be to search for concepts within a specific domain, and let the text analysis engine do the hard work of identifying and reporting back only relevant concepts.

An example of this type of analysis (also called supervised analysis) would be to identify only equipment related issues mentioned by pilots in their narratives. Being instructed to focus on specific concepts (‘*equipment*’ and ‘*device*’ in this project), the Text Analysis (TA) engine sifts through the entire Narrative portion of the database and automatically returns back concepts like ‘*radio*’, ‘*switch*’, ‘*brakes*’, and ‘*nosewheel*’. Fig. 4 pictorially represents this process of intelligently extracting chosen categories of concepts (in this case, *Equipment*).

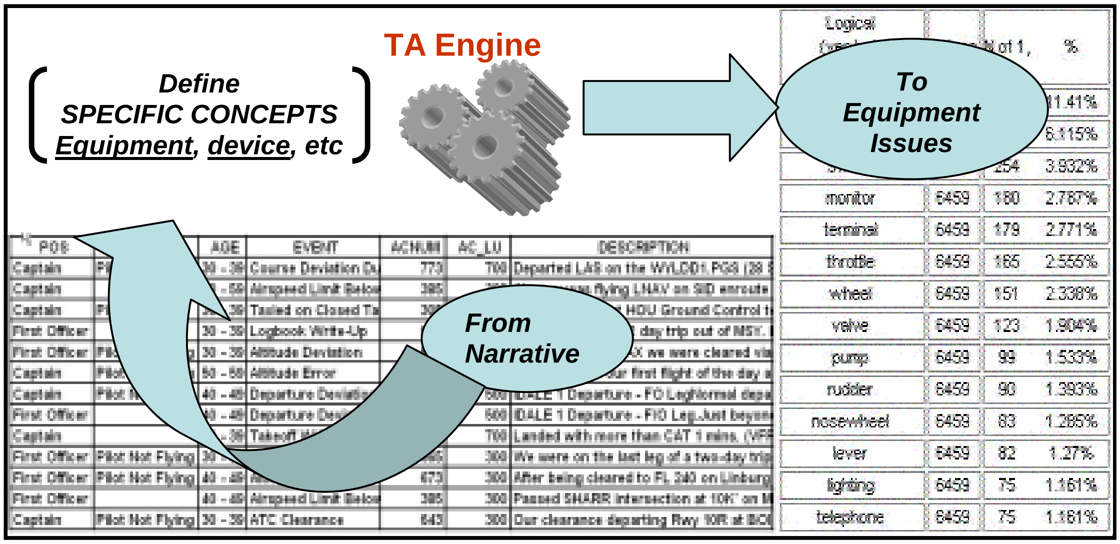


Figure 4: Process of searching for specific concepts.

Note that the system is smart enough to understand the ‘*equipment*’ query and then identify all related words and phrases. The system enables specific user-desired charts and visualizations as shown in Fig. 5.

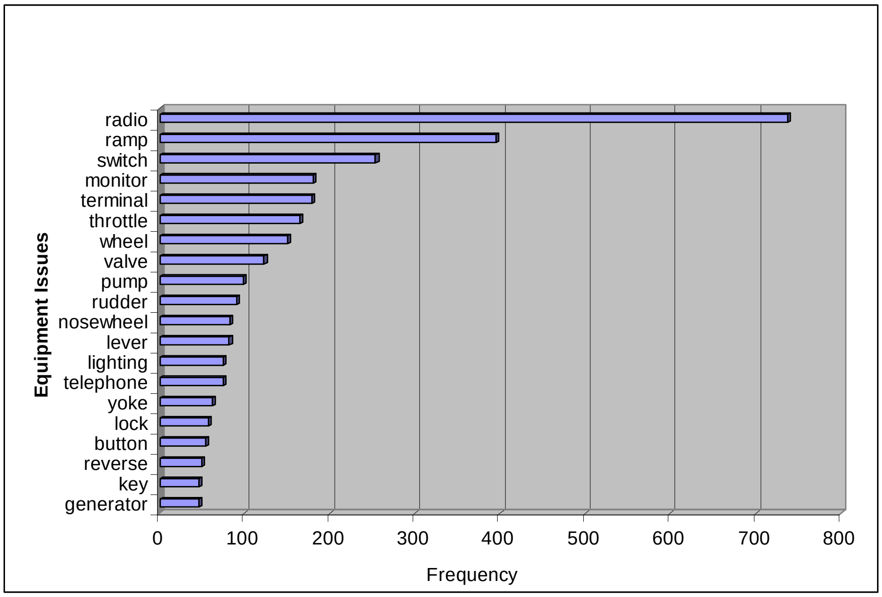


Figure 5: Equipment related issues mentioned by Pilots.

2) Gain Strategic Insight

Airline management seeks better understanding of how the pilot concerns are varying across the company business assets, divisions and other categories. PolyAnalyst Snake Charts, utilized in combination with supervised text analysis, can deliver such understanding by producing insightful views of the investigated issues.

For example, Fig. 6 below shows how individual '*Equipment*' concerns (identified by the TA engine, as illustrated in Fig. 4 above) can be compared across different aircraft types, in this case - B737 and MD-80.

The blue line on the graph represent an overall average frequency occurrence across all aircrafts (World data set contains all investigated incident reports). Green and pink lines represent relative frequencies of 'Equipment' concerns for B737 and MD-80 compared to their overall background. The spikes indicate that the occurrence of these terms is relatively more frequent than average. For example, B737 (green line) has issues related to '*screw*', '*controller*', '*lever*', '*toggle switch*', '*wiper*' and '*spool*' while MD-80 (pink line) has issues related to *'flat tire'*, *'blade'*, *'receiver'*, *'faucet'*, etc.

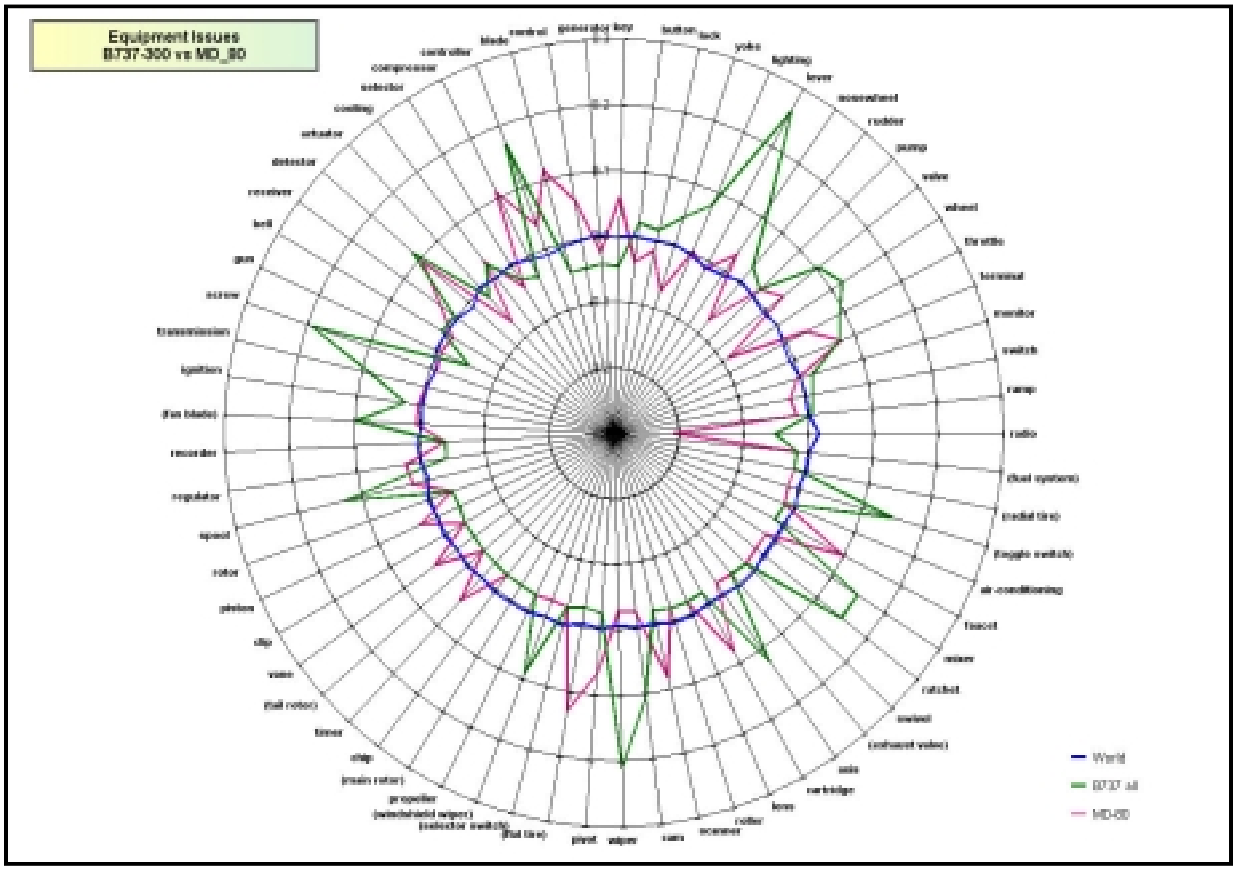
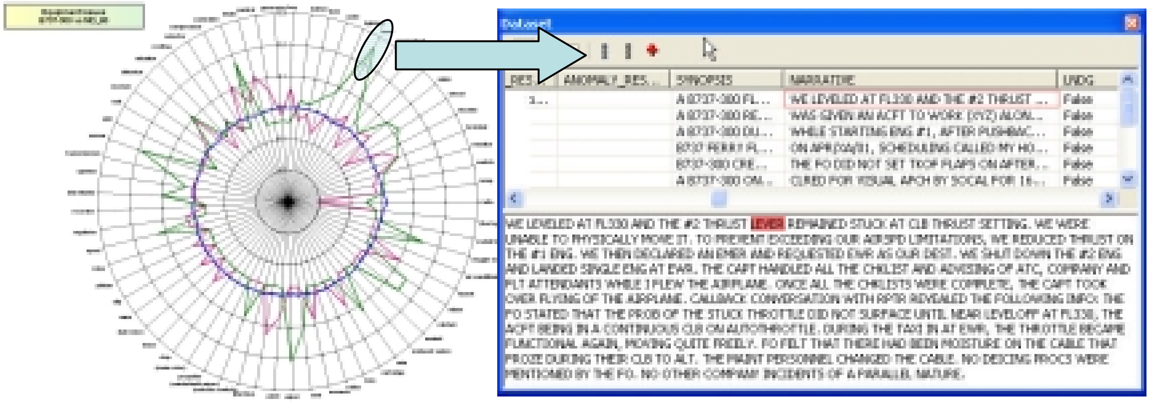


Fig. 6. Compare relative importance of equipment-related issues across different aircraft types.

Now the management can see problematic issues and put in place preventive mechanisms to avert future problems. The Snake Chart enables a quick comparison of different tracked parameters across any dimensions of interest.

The user can also click on a chosen concept, say '*lever*' issue associated with Boeing 737 and drill down to view the associated records (see Fig. 7).



Dataset

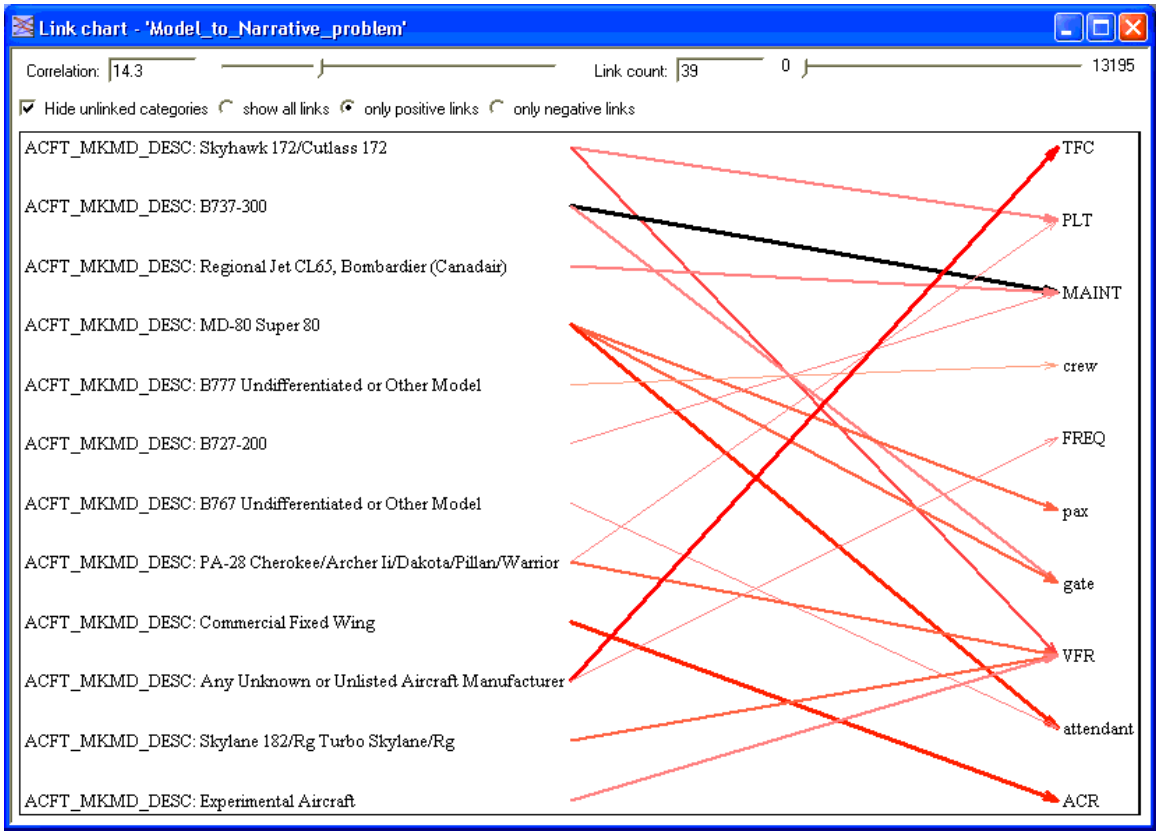
_RES...	ANOMALY_RES...	SYNOPSIS	NARRATIVE	UNDG
1...		A B737-300 FL...	WE LEVELED AT FL330 AND THE #2 THRUST ...	False
		A B737-300 RE...	WAS GIVEN AN ACFT TO WORK (XYZ) ALON...	False
		A B737-300 DU...	WHILE STARTING ENG #1, AFTER PUSHBAC...	False
		B737 FERRY FL...	ON APR/XX/01, SCHEDULING CALLED MY HO...	False
		B737-300 CRE...	THE FO DID NOT SET T/O FLAPS ON AFTER...	False
		A B737-300 ON...	CLRED FOR VISUAL APCH BY SOCAL FOR 1...	False

WE LEVELED AT FL330 AND THE #2 THRUST LEVER REMAINED STUCK AT CLB THRUST SETTING. WE WERE UNABLE TO PHYSICALLY MOVE IT. TO PREVENT EXCEEDING OUR AIRSPD LIMITATIONS, WE REDUCED THRUST ON THE #1 ENG. WE THEN DECLARED AN EMER AND REQUESTED EWR AS OUR DEST. WE SHUT DOWN THE #2 ENG AND LANDED SINGLE ENG AT EWR. THE CAPT HANDLED ALL THE CHKLIST AND ADVISING OF ATC, COMPANY AND FLT ATTENDANTS WHILE I FLEW THE AIRPLANE. ONCE ALL THE CHKLISTS WERE COMPLETE, THE CAPT TOOK OVER FLYING OF THE AIRPLANE. CALLBACK CONVERSATION WITH RPTR REVEALED THE FOLLOWING INFO: THE FO STATED THAT THE PROB OF THE STUCK THROTTLE DID NOT SURFACE UNTIL NEAR LEVELOFF AT FL330. THE ACFT BEING IN A CONTINUOUS CLB ON AUTOTHROTTLE. DURING THE TAXI IN AT EWR, THE THROTTLE BECAME FUNCTIONAL AGAIN, MOVING QUITE FREELY. FO FELT THAT THERE HAD BEEN MOISTURE ON THE CABLE THAT FROZE DURING THEIR CLB TO ALT. THE MAINT PERSONNEL CHANGED THE CABLE. NO DEICING PROCS WERE MENTIONED BY THE FO. NO OTHER COMPANY INCIDENTS OF A PARALLEL NATURE.

Fig. 7. Drill-down feature allows viewing records related to the investigated issue.

3) Identify high correlation entities

Calculating and visualizing mutual correlations of attribute values, one gains knowledge of stable patterns of co-occurrences of different values of individual attributes. Fig. 8 suggests a quick way to view the most important correlations between items of interest and learn if any of the pilot concerns have a high correlation with specific aircraft types.



Link chart - 'Model_to_Narrative_problem'

Correlation: 14.3

Link count: 39

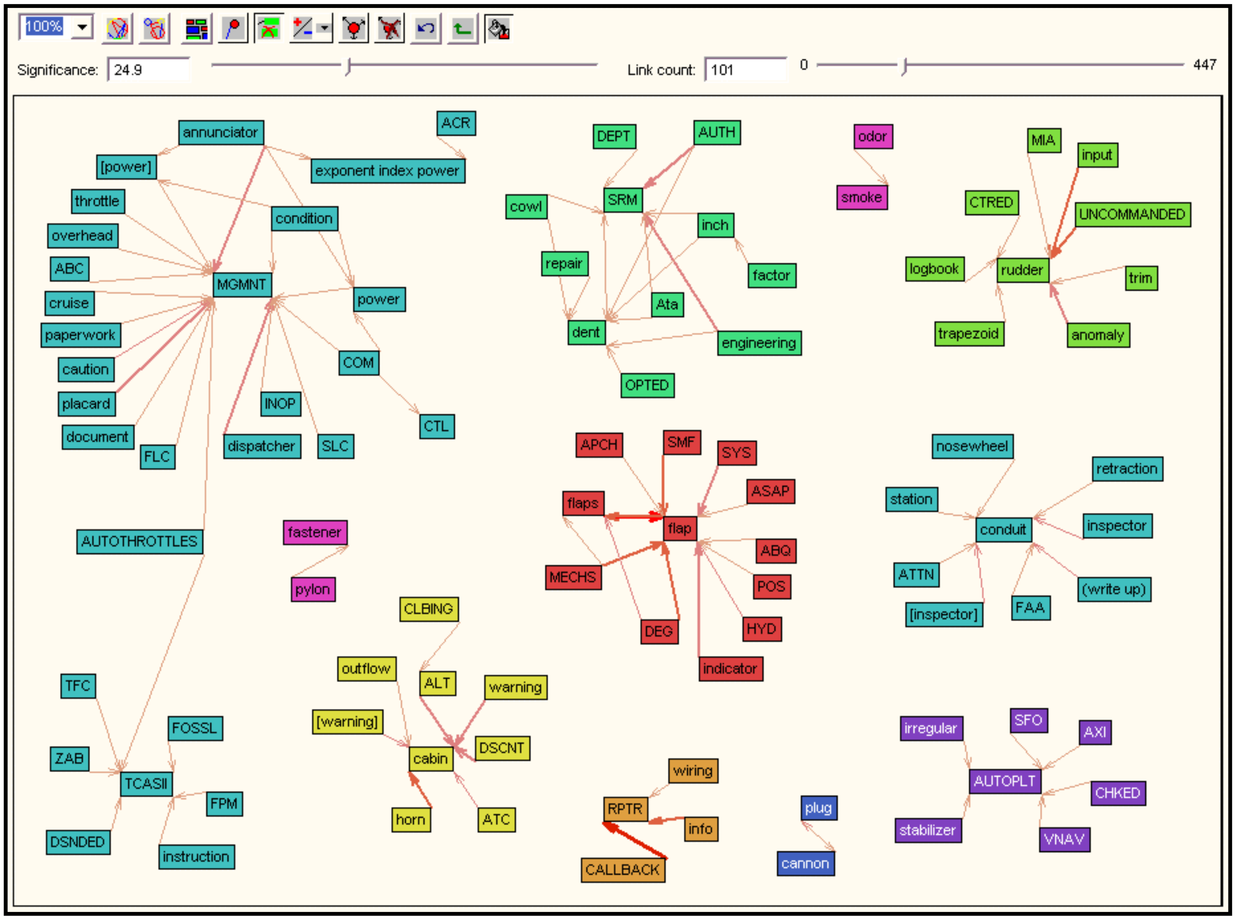
☑ Hide unlinked categories ○ show all links ● only positive links ○ only negative links

Fig. 8. Correlations between Aircraft type and pilot concerns extracted from free text Narratives.

The intensity of the line is a measure of the strength of the corresponding correlation. The user can infer that *B737-300*, *B727-200 and Regional Jet CL65* aircraft types (on the left side) have high correlations with the term *'MAINT'* mentioned in the narrative (right side of the figure). Another inference from the above chart could be the high correlation of the concepts *'pax'*, *'gate'* and *'attendant'* to *MD-80 Super 80* aircraft type. Note that the user can easily visualize correlations between important items from both structured and unstructured parts of the database.

4) Identify Patterns of concerns:

An ability to capture stable patterns of terms, not known in advance but describing main issues of concern without having to read through all the records, can provide valuable insights for quick comprehension of past experience and save time of an FSO for more advanced analysis. PolyAnalyst Link Terms engine can be used to reveal clusters of terms from the narrative portion of pilot reports. The Link Terms diagram (Fig. 9) displays the discovered patterns of terms and relations between them.



100%

Significance: 24.9

Link count: 101

0

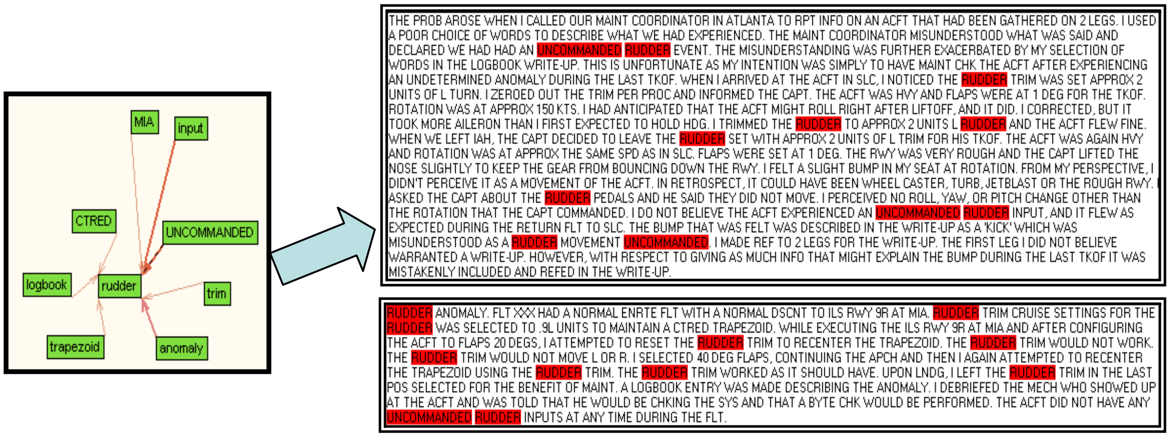
447

Fig. 9. View clusters of terms that represent stable patterns discovered in textual Pilot narratives.

Link Terms produced ten clusters, each denoted by a different color. These clusters now instigate the user to find out why

- ‘*Rudder*’ is highly correlated with ‘*UNCOMMANDED*’, ‘*trim*’, ‘*trapezoid*’, ‘*anomaly*’ and ‘*logbook*’ (cluster shown in light green)?
- ‘*TCASII*’ is mentioned together with ‘*AUTOTHROTTLES*’ (cluster shown in light blue)?

Additional insight into individual clusters is provided by drilling down and viewing the corresponding narratives with terms of interest highlighted. Fig. 10 presents the results of drilling down on the ‘*UNCOMMANDED*’ <--> ‘*rudder*’ link from the “rudder” (light green) cluster of the above Link Terms diagram, thus giving an analyst the ability to quickly verify significance of patterns of interest.



THE PROB AROSE WHEN I CALLED OUR MAINT COORDINATOR IN ATLANTA TO RPT INFO ON AN ACFT THAT HAD BEEN GATHERED ON 2 LEGS. I USED A POOR CHOICE OF WORDS TO DESCRIBE WHAT WE HAD EXPERIENCED. THE MAINT COORDINATOR MISUNDERSTOOD WHAT WAS SAID AND DECLARED WE HAD HAD AN UNCOMMANDED RUDDER EVENT. THE MISUNDERSTANDING WAS FURTHER EXACERBATED BY MY SELECTION OF WORDS IN THE LOGBOOK WRITE-UP. THIS IS UNFORTUNATE AS MY INTENTION WAS SIMPLY TO HAVE MAINT CHK THE ACFT AFTER EXPERIENCING AN UNDETERMINED ANOMALY DURING THE LAST TKOF. WHEN I ARRIVED AT THE ACFT IN SLC, I NOTICED THE RUDDER TRIM WAS SET APPROX 2 UNITS OF L TURN. I ZEROED OUT THE TRIM PER PROC AND INFORMED THE CAPT. THE ACFT WAS HVY AND FLAPS WERE AT 1 DEG FOR THE TKOF. ROTATION WAS AT APPROX 150 KTS. I HAD ANTICIPATED THAT THE ACFT MIGHT ROLL RIGHT AFTER LIFTOFF, AND IT DID. I CORRECTED, BUT IT TOOK MORE AILERON THAN I FIRST EXPECTED TO HOLD HDG. I TRIMMED THE RUDDER TO APPROX 2 UNITS L RUDDER AND THE ACFT FLEW FINE. WHEN WE LEFT IAH, THE CAPT DECIDED TO LEAVE THE RUDDER SET WITH APPROX 2 UNITS OF L TRIM FOR HIS TKOF. THE ACFT WAS AGAIN HVY AND ROTATION WAS AT APPROX THE SAME SPD AS IN SLC. FLAPS WERE SET AT 1 DEG. THE RWY WAS VERY ROUGH AND THE CAPT LIFTED THE NOSE SLIGHTLY TO KEEP THE GEAR FROM BOUNCING DOWN THE RWY. I FELT A SLIGHT BUMP IN MY SEAT AT ROTATION. FROM MY PERSPECTIVE, I DIDN'T PERCEIVE IT AS A MOVEMENT OF THE ACFT. IN RETROSPECT, IT COULD HAVE BEEN WHEEL CASTER, TURB, JETBLAST OR THE ROUGH RWY. I ASKED THE CAPT ABOUT THE RUDDER PEDALS AND HE SAID THEY DID NOT MOVE. I PERCEIVED NO ROLL, YAW, OR PITCH CHANGE OTHER THAN THE ROTATION THAT THE CAPT COMMANDED. I DO NOT BELIEVE THE ACFT EXPERIENCED AN UNCOMMANDED RUDDER INPUT, AND IT FLEW AS EXPECTED DURING THE RETURN FLT TO SLC. THE BUMP THAT WAS FELT WAS DESCRIBED IN THE WRITE-UP AS A 'KICK' WHICH WAS MISUNDERSTOOD AS A RUDDER MOVEMENT UNCOMMANDED. I MADE REF TO 2 LEGS FOR THE WRITE-UP. THE FIRST LEG I DID NOT BELIEVE WARRANTED A WRITE-UP. HOWEVER, WITH RESPECT TO GIVING AS MUCH INFO THAT MIGHT EXPLAIN THE BUMP DURING THE LAST TKOF IT WAS MISTAKENLY INCLUDED AND REFED IN THE WRITE-UP.

RUDDER ANOMALY. FLT XXX HAD A NORMAL ENRTE FLT WITH A NORMAL DSCNT TO ILS RWY 9R AT MIA. RUDDER TRIM CRUISE SETTINGS FOR THE RUDDER WAS SELECTED TO .9L UNITS TO MAINTAIN A CTRED TRAPEZOID. WHILE EXECUTING THE ILS RWY 9R AT MIA AND AFTER CONFIGURING THE ACFT TO FLAPS 20 DEGS, I ATTEMPTED TO RESET THE RUDDER TRIM TO RECENTER THE TRAPEZOID. THE RUDDER TRIM WOULD NOT WORK. THE RUDDER TRIM WOULD NOT MOVE L OR R. I SELECTED 40 DEG FLAPS, CONTINUING THE APCH AND THEN I AGAIN ATTEMPTED TO RECENTER THE TRAPEZOID USING THE RUDDER TRIM. THE RUDDER TRIM WORKED AS IT SHOULD HAVE. UPON LNDG, I LEFT THE RUDDER TRIM IN THE LAST POS SELECTED FOR THE BENEFIT OF MAINT. A LOGBOOK ENTRY WAS MADE DESCRIBING THE ANOMALY. I DEBRIEFED THE MECH WHO SHOWED UP AT THE ACFT AND WAS TOLD THAT HE WOULD BE CHKING THE SYS AND THAT A BYTE CHK WOULD BE PERFORMED. THE ACFT DID NOT HAVE ANY UNCOMMANDED RUDDER INPUTS AT ANY TIME DURING THE FLT.

Fig. 10. Some pilot narratives that support the Link Terms cluster centered on '*rudder*'.

The number of reports submitted by pilots grows over time causing the relevance of concepts to change too. Thus the above links between terms may assume more or less important significance as time progresses and can serve as a valuable tool for knowing whether there are changing patterns.

Application of Results of Analysis

The outputs of the link analysis and snake charts deliver explicit and actionable results that can be used by the business manager to rectify the observed anomalies. For example the safety manager can use this type of information to assess Pilot concerns across age groups. Another example would be for flight operations and maintenance analysts to identify issues related to aircraft makes, types, and specific aircraft. The scope of the analysis can also be extended to identifying problem parts and supplier quality issues.

Overall, the results obtained by PolyAnalyst can be further investigated and manipulated within the system and exported in a report, while the discovered predictive models can be scheduled for online execution or applied to data in the original database to store the predicted outcome of future situations. The Megaputer integration platform lets power users of the system to record reusable analytical scripts implementing typical data exploration scenarios, and business users – access over the Internet the resulting periodically updates reports in the format of preset templates.

Conclusion

This paper outlined just a few standard scenarios for safety data analysis that can be performed with the help of PolyAnalyst. The described project demonstrated that a synergetic combination of automated text analysis and visual presentation of discovered clusters and correlations can significantly reduce the latency and bias of the analysis, automate the most time-intensive operations and increase the thoroughness and quality of the obtained results.

PolyAnalyst generates significant new business value through:

- Capturing previously unanticipated knowledge from raw data
- Efficient use of analyst's time
- Automation of repetitive processes, which removes latency of manual processing
- Reduced cost and increased accuracy of incident data analysis
- Quick intelligent analysis of textual data
- Consistent and comprehensive utilization of *all* available data (structured and unstructured)

Summarizing, PolyAnalyst helps improving aviation safety and preventing potential accidents through early and accurate detection of problem areas from the analysis of incident reports data. An evaluation copy of PolyAnalyst can be downloaded from www.megaputer.com.