ANALYSIS OF SALES FORECAST AND PERFORMANCE RISK

Sales Plan Uncertainty

The lifeblood of every commercial organization is the revenue stream that pays its expenses and funds its growth. No organization can survive for long if the capture of new revenues does not surpass the accumulation of costs sustained from its operations. The designation of *sales* as the essential task of a business must be understood and applied as the mantra of management if a healthy organization is to be able to support all of its operations and goals.

The need for sales of a company's products is continual (i.e., necessary every day, week, month, quarter, year), but no sale is actually attained until a customer has decided to buy the products or services presented and the company has received payment in exchange for said products or services. The customer decision is ultimately beyond the control of the company and can only be solicited, cajoled, and requested by sales staff. Nevertheless, every company needs assurances of what sales level will be attained and if that level will be sufficient to support the costs of the company. There is, by definition, an element of uncertainty and risk associated with the forecasts reported for what sales will occur within a specified future period, and every organization needs to understand the risks that the reported sales forecasts will not be met. No company likes to receive the bad news that forecasts have not been met, especially when no thought was given to the possibility of underperformance prior to its occurrence. End-of-period actions are too late to provide assistance in making sales goals. In a world of uncertainty, knowing the level of risks contained within sales forecasts is essential for management to be able to tactically act in time to have a significant effect on final sales results.

How confident will a CEO be when providing sales forecasts for the next quarter to Wall Street analysts, the board of directors, or shareholders in general? Are the risks and uncertainties affecting these sales projections known? What are the risks and probabilities the sales goals will never be attained? Is the sales force optimized to maximize potential pipeline sales? Is the sales team converting enough potential clients into tangible sales? What is the sales cycle or pipeline conversion rate? In this whitepaper, we answer these questions by applying the Integrated Risk Management (IRM) methods to sales projections and pipeline analysis, namely, the applications of Monte Carlo risk simulation, stochastic forecasting, decision analytics, probabilistic mechanics, statistical analysis, and portfolio optimization.

Sales Management Case: Automotive Replacement Parts, Inc.

This case study is based on the actual experience of Automotive Replacement Parts, Inc.'s application of software tools created by Real Options Valuation, Inc. (ROV). The products and services for sales performance management of ROV are provided through its subsidiary, Goals HQ. Fictional names and data have been used to protect the privacy of the organization.

Automotive Replacement Parts, Inc. (ARP) is a national provider of systems used by U.S. and Canadian parts manufacturers whose products are included in automobiles and light trucks. To serve its customers, ARP has sales staff located in seven territories: Northeast, Northcentral, Northwest, Southwest, Southcentral, Southeast, and Canada. ARP believes that its sales staff are most successful when they know what the corporate goals for total sales are and the part that each salesperson plays in making that goal (the individual quota). To provide this information, ARP has employed the ROV/Goals HQ Sales Performance Indicator, Data, Event, and Reporting (SPIDER) cloud-based application. SPIDER is a Web-based Software as a Service (SaaS) that allows companies to post their sales goals at each level of an organization via a secured online portal; from the total headquarters' goal to the goals of particular Departments, Teams, and Sales Individuals. Each salesperson is appraised on a regular basis (at least daily or weekly) of their status vis-à-vis the status of the rest of the organization. Studies have shown that persons who know their relative roles in the accomplishment of a goal actually achieve better results (higher numbers, more consistently, over more periods). ARP then uses the ROV/Goals HQ Sales Performance Evaluation Analysis and Reporting (SPEAR) analytical tool to evaluate the sales performance of its staff. SPEAR is a desktop application that uses the data created within SPIDER to reveal the characteristics of the actual sales, forecasts, and sales pipeline. ARP believes it can better manage its staff and allow them to be more successful by keeping them informed of each period's sales target and by enabling each sales individual to make personal updates to his or her status as those sales successes occur. The entire organization sees the accomplishments in real time while corporate headquarters is supplied with the necessary data to predict final period outcomes and the risks of underperformance well before a period ends.

Several problems exist with most sales incentive programs: they are post-event oriented, they are inequitable, and they can be inaccurate. Regarding the problem of being too late to help, SPEAR is a statistically based program that can harvest data based on the frequency desired by management and certainly during the period when there are still opportunities to review and take actions if necessary to ensure that goals are achieved. Regarding being unfair in some cases, SPEAR allows the company to see sales staff within their respective teams as well as comparisons among each individual's contribution toward the corporate goal across regions and departments. Regarding accuracy, SPEAR provides complete oversight of not just actual sales contributions but also accuracy of forecasts and the health and volatility of the pipeline. All these benefits are initiated by the use of SPIDER and then realized by the application of the conclusions produced in SPEAR.

ARP Implementation of SPIDER

The setup of SPIDER is accomplished through the Goals HQ Web site (www.goalshq.com). This is a public home page but also a Login portal. Staff of Goals HQ assign a login per client company such as ARP, and create a Local Administrator (LA) account and multiple End-User (EU) accounts. The security level on all LA and EU users as well as the pertinent company-specific information is entered (Figure 1).

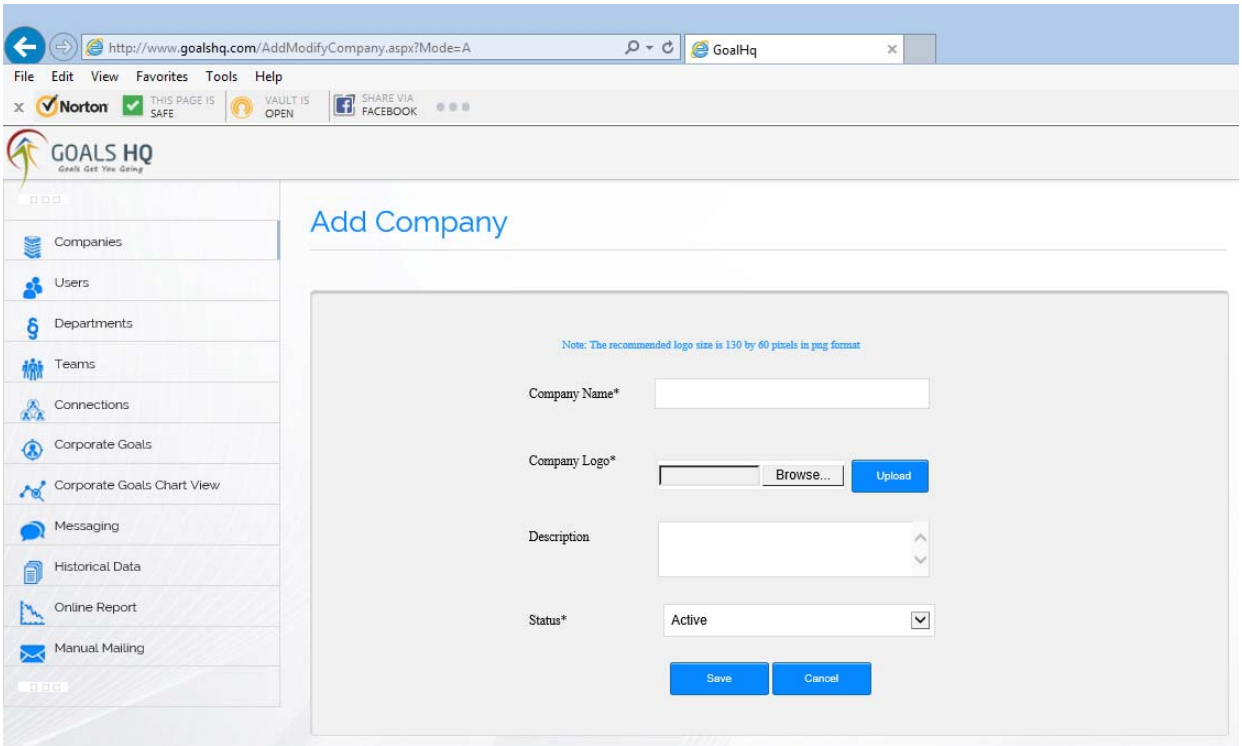


FIGURE 1 Goals HQ's global administration of a new company.

After the unique corporate identity and LA/EU accounts have been created, the ARP LA uses its secure login to establish the basic structure of the sales organizations and who will participate in the program (Figure 2). The information entered by the LA includes the territorial arrangement of the sales areas and the individuals themselves with their contact details, as well as who will have access to and be tracked by the program (Figures 3, 4, and 5).

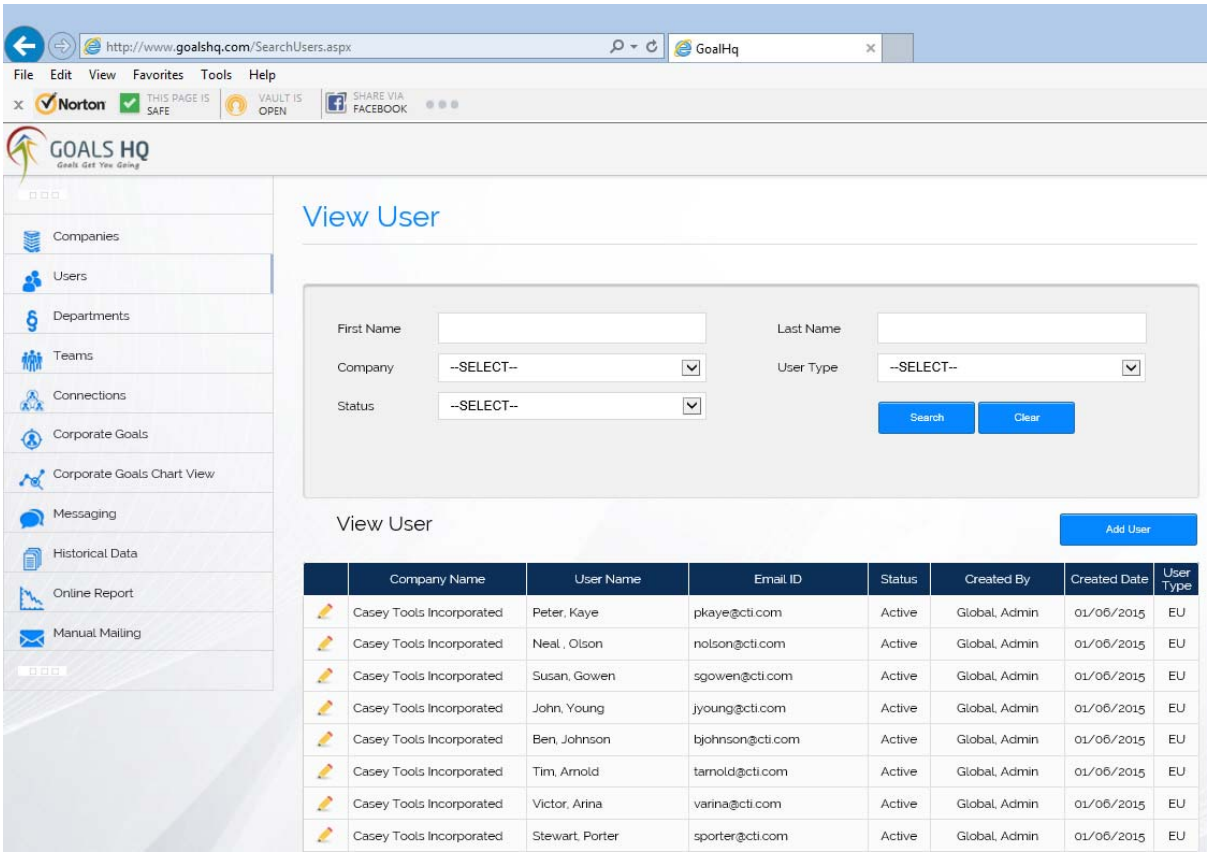


FIGURE 2 Individuals participating in the goals program are entered.

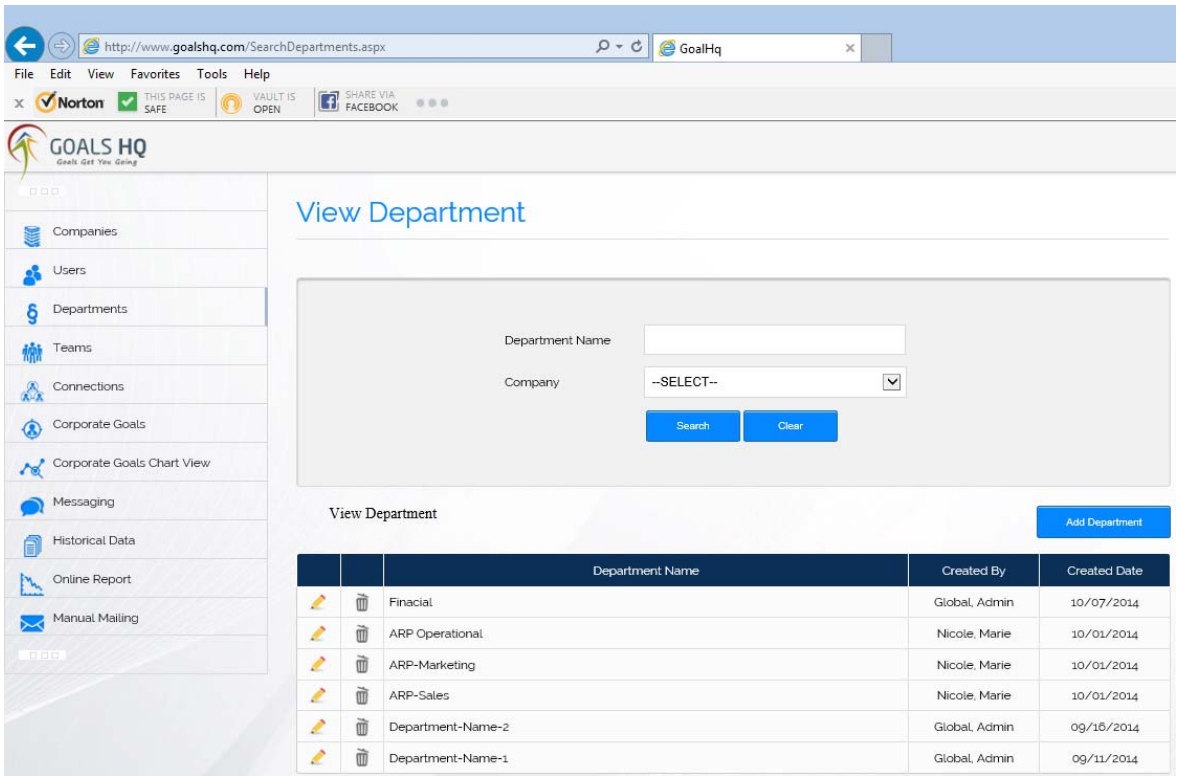


FIGURE 3 Assignment of departments per company.

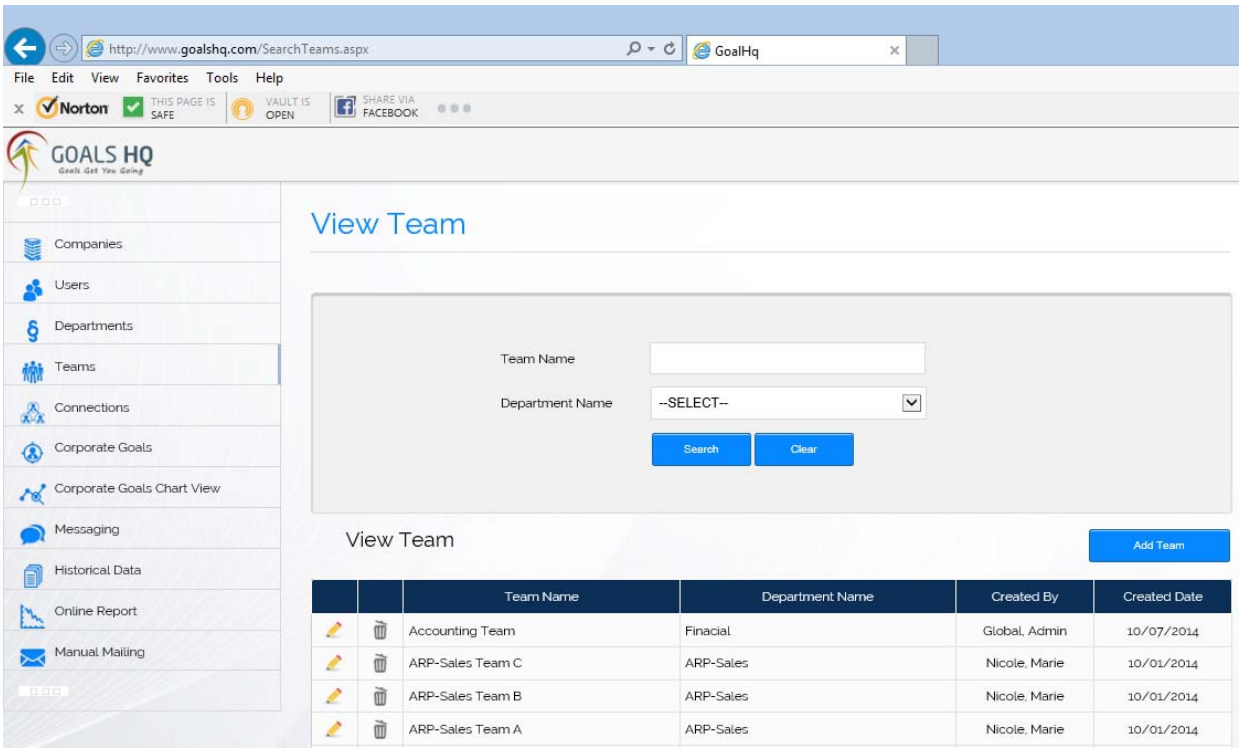


FIGURE 4 **Team designations such as specific sales territory assignments.**

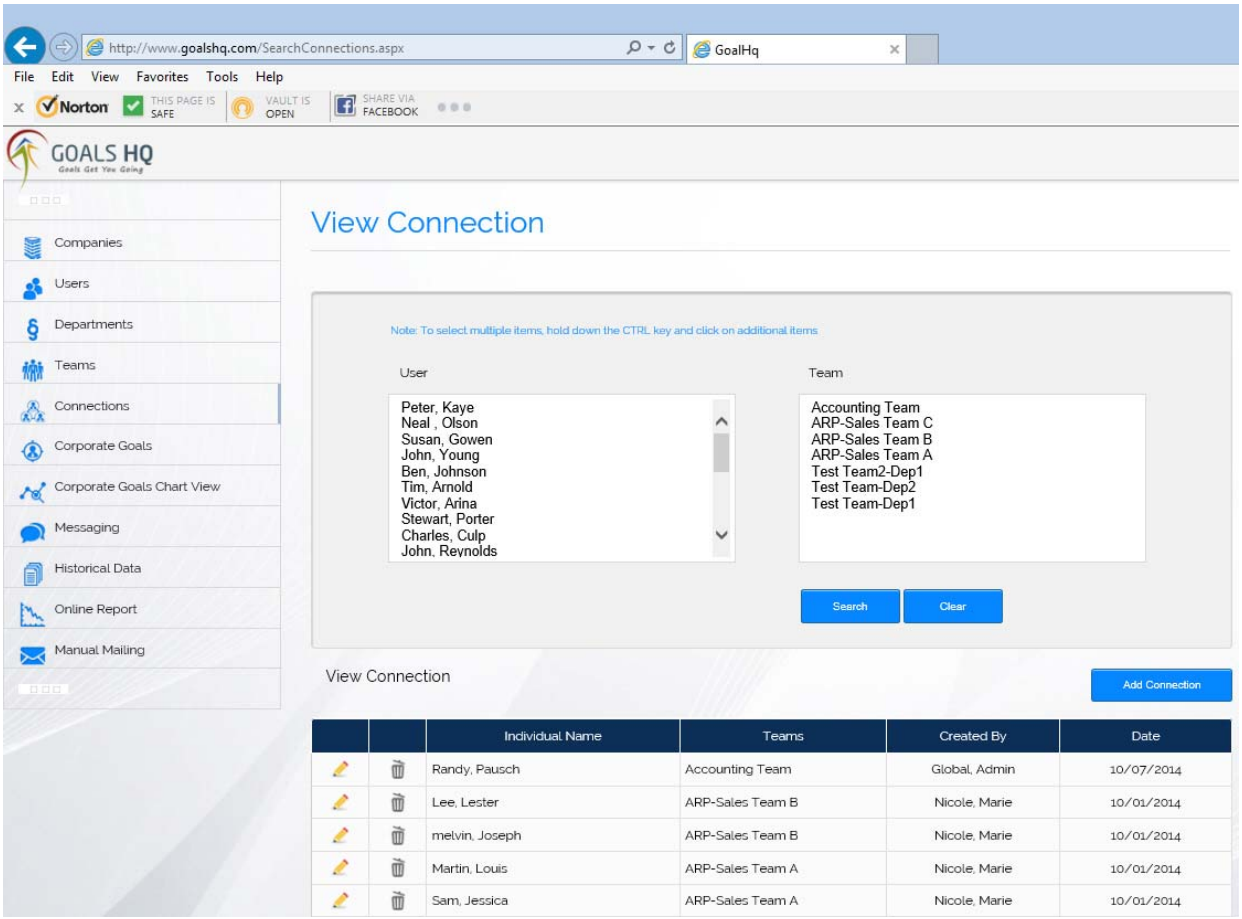


FIGURE 5 **Individual staff members are assigned to their respective teams.**

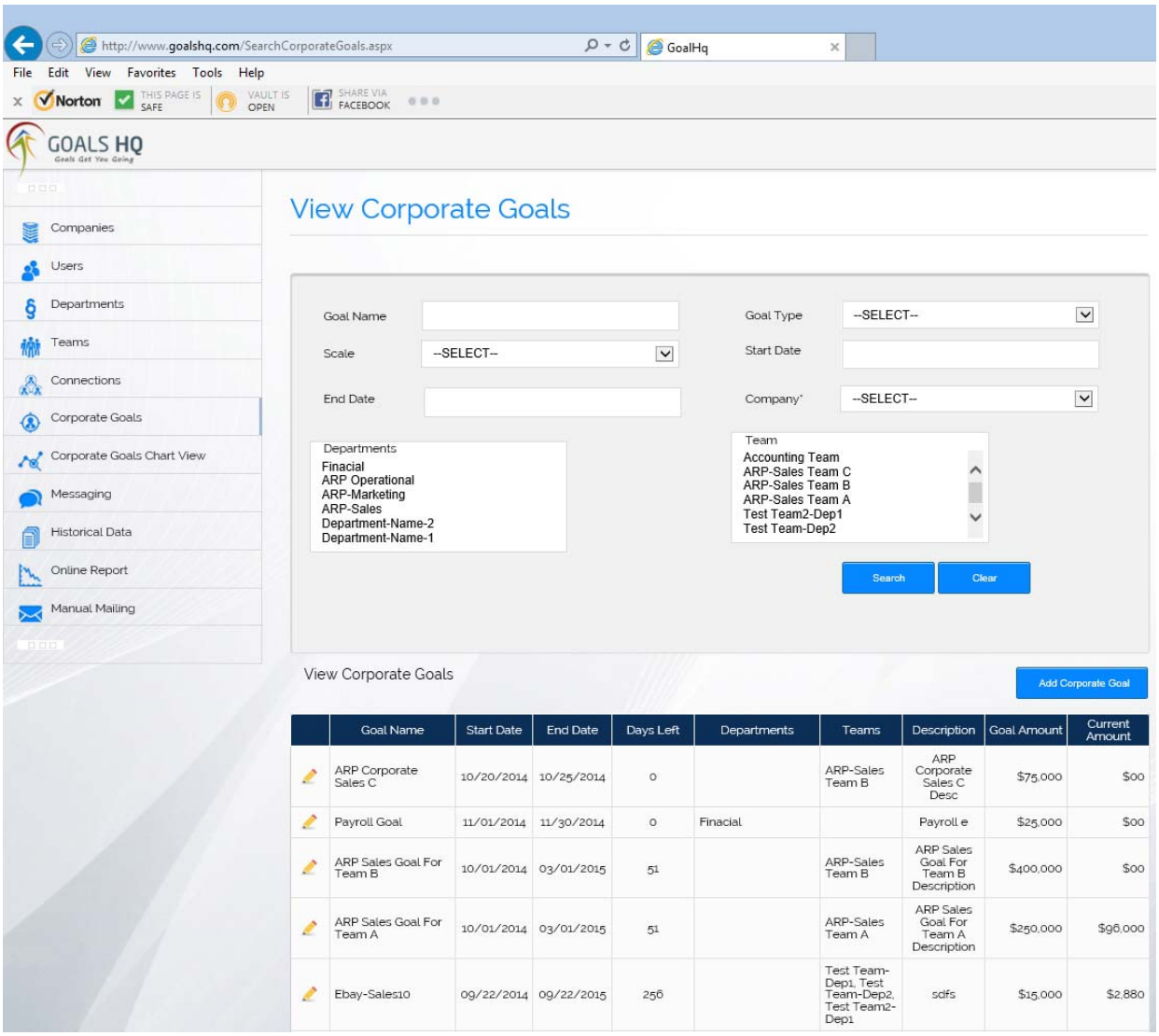


FIGURE 6 Entry of the Goal relative to each department.

Each individual participating in the program signs into the Goals HQ Web site and accepts the individual goal per period that is assigned per Department/Team (territory), as shown in Figure 6. The individual sign-in provides an instant view of the Goal status of the organization in four charts as shown in Figure 7. The Goals HQ program also sends a status of sales performance to each participant in the sales chain via email per the frequency determined by the LA.

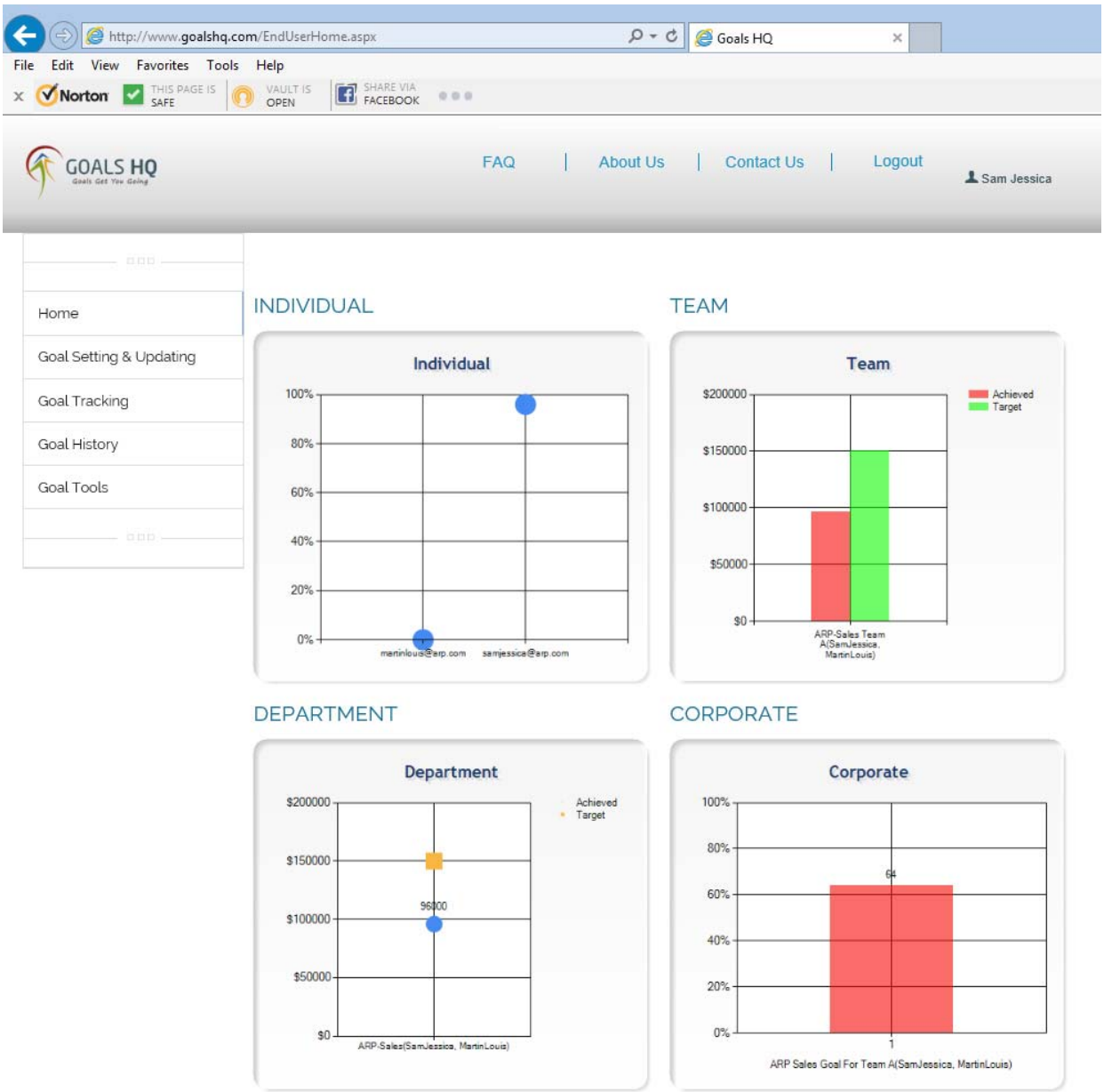
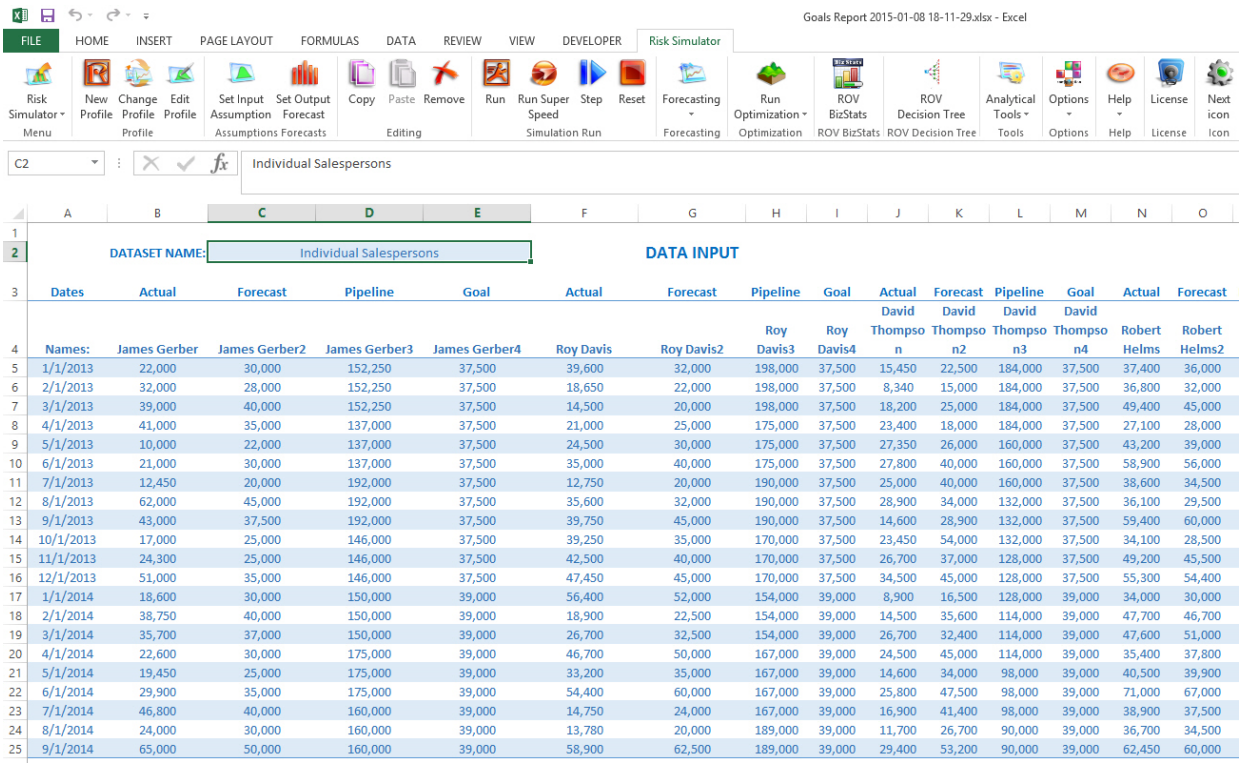


FIGURE 7 Status screen per individual.

The Goals HQ status and communications service, SPIDER, is a SaaS program that provides easy online access and ensures private and secure use by each corporate client. Use of the program benefits all levels of a sales organization through continuous communication, broad and specific perspectives, and a sense of urgency by tracking the remaining work days and remaining sales deficit pertaining to the target per period. SPIDER also is the database creation engine for the essential information that is used by the next phase of the program, SPEAR. Transfer of data between the two services is simple using preprogrammed import/export functions. Excel is an output option of SPIDER available at the LA

account level for use on demand. Of course, the LA can review sales status whenever desired at any level of the organization.

The spreadsheet in Figure 8 shows the detailed ARP individual sales results by period. Each row has all the data for all the salespersons included in the program for a particular period. The columns per salesperson are Actual Sales, Sales Forecast, Pipeline, and Sales Goal. The column variables are repeated for different salespersons across the spreadsheet.



	Dates	Actual	Forecast	Pipeline	Goal	Actual	Forecast	Pipeline	Goal	Actual	Forecast	Pipeline	Goal	Actual	Forecast
4	Names:	James Gerber	James Gerber2	James Gerber3	James Gerber4	Roy Davis	Roy Davis2	Roy Davis3	Roy Davis4	David Thompson	David Thompson2	David Thompson3	David Thompson4	Robert Helms	Robert Helms2
5	1/1/2013	22,000	30,000	152,250	37,500	39,600	32,000	198,000	37,500	15,450	22,500	184,000	37,500	37,400	36,000
6	2/1/2013	32,000	28,000	152,250	37,500	18,650	22,000	198,000	37,500	8,340	15,000	184,000	37,500	36,800	32,000
7	3/1/2013	39,000	40,000	152,250	37,500	14,500	20,000	198,000	37,500	18,200	25,000	184,000	37,500	49,400	45,000
8	4/1/2013	41,000	35,000	137,000	37,500	21,000	25,000	175,000	37,500	23,400	18,000	184,000	37,500	27,100	28,000
9	5/1/2013	10,000	22,000	137,000	37,500	24,500	30,000	175,000	37,500	27,350	26,000	160,000	37,500	43,200	39,000
10	6/1/2013	21,000	30,000	137,000	37,500	35,000	40,000	175,000	37,500	27,800	40,000	160,000	37,500	58,900	56,000
11	7/1/2013	12,450	20,000	192,000	37,500	12,750	20,000	190,000	37,500	25,000	40,000	160,000	37,500	38,600	34,500
12	8/1/2013	62,000	45,000	192,000	37,500	35,600	32,000	190,000	37,500	28,900	34,000	132,000	37,500	36,100	29,500
13	9/1/2013	43,000	37,500	192,000	37,500	39,750	45,000	190,000	37,500	14,600	28,900	132,000	37,500	59,400	60,000
14	10/1/2013	17,000	25,000	146,000	37,500	39,250	35,000	170,000	37,500	23,450	54,000	132,000	37,500	34,100	28,500
15	11/1/2013	24,300	25,000	146,000	37,500	42,500	40,000	170,000	37,500	26,700	37,000	128,000	37,500	49,200	45,500
16	12/1/2013	51,000	35,000	146,000	37,500	47,450	45,000	170,000	37,500	34,500	45,000	128,000	37,500	55,300	54,400
17	1/1/2014	18,600	30,000	150,000	39,000	56,400	52,000	154,000	39,000	8,900	16,500	128,000	39,000	34,000	30,000
18	2/1/2014	38,750	40,000	150,000	39,000	18,900	22,500	154,000	39,000	14,500	35,600	114,000	39,000	47,700	46,700
19	3/1/2014	35,700	37,000	150,000	39,000	26,700	32,500	154,000	39,000	26,700	32,400	114,000	39,000	47,600	51,000
20	4/1/2014	22,600	30,000	175,000	39,000	46,700	50,000	167,000	39,000	24,500	45,000	114,000	39,000	35,400	37,800
21	5/1/2014	19,450	25,000	175,000	39,000	33,200	35,000	167,000	39,000	14,600	34,000	98,000	39,000	40,500	39,900
22	6/1/2014	29,900	35,000	175,000	39,000	54,400	60,000	167,000	39,000	25,800	47,500	98,000	39,000	71,000	67,000
23	7/1/2014	46,800	40,000	160,000	39,000	14,750	24,000	167,000	39,000	16,900	41,400	98,000	39,000	38,900	37,500
24	8/1/2014	24,000	30,000	160,000	39,000	13,780	20,000	189,000	39,000	11,700	26,700	90,000	39,000	36,700	34,500
25	9/1/2014	65,000	50,000	160,000	39,000	58,900	62,500	189,000	39,000	29,400	53,200	90,000	39,000	62,450	60,000

FIGURE 8 Exported spreadsheet of data generated by SPIDER.

ARP Implementation of SPEAR

The data generated by SPIDER allows ARP to see the trends at each level of the sales organization. However, the in-depth examination of sales performance is the job of the various analysis suites included in the program called SPEAR. Section A of SPEAR's setup screen under the *Sales Data | Global Settings* tab allows for the selection of period and weightings of performance factors. Section B is a list of the individuals within their various sales territories (team and department assignments).

Figure 9 shows the ARP sales organization assignments for all the Individuals, Teams, and Department designations. This information can be entered or pasted into the SPEAR program from other sales force automation (SFA) software applications.

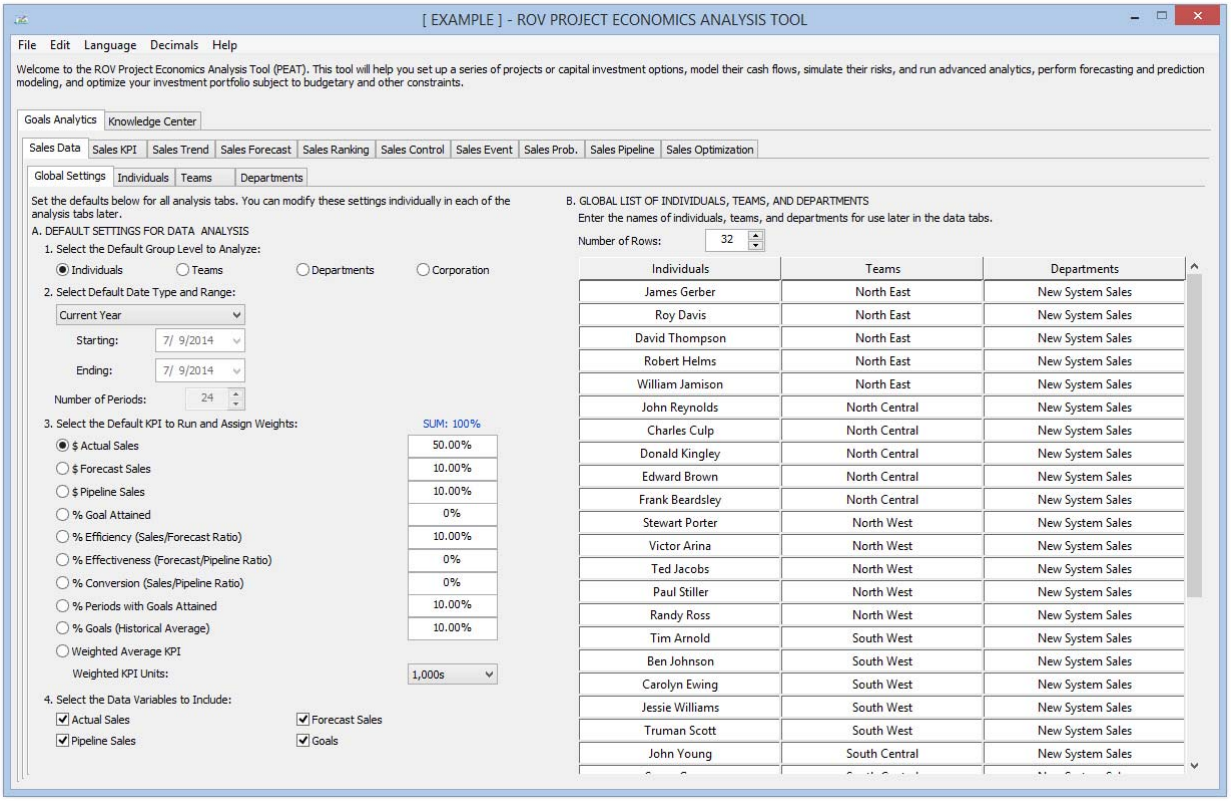
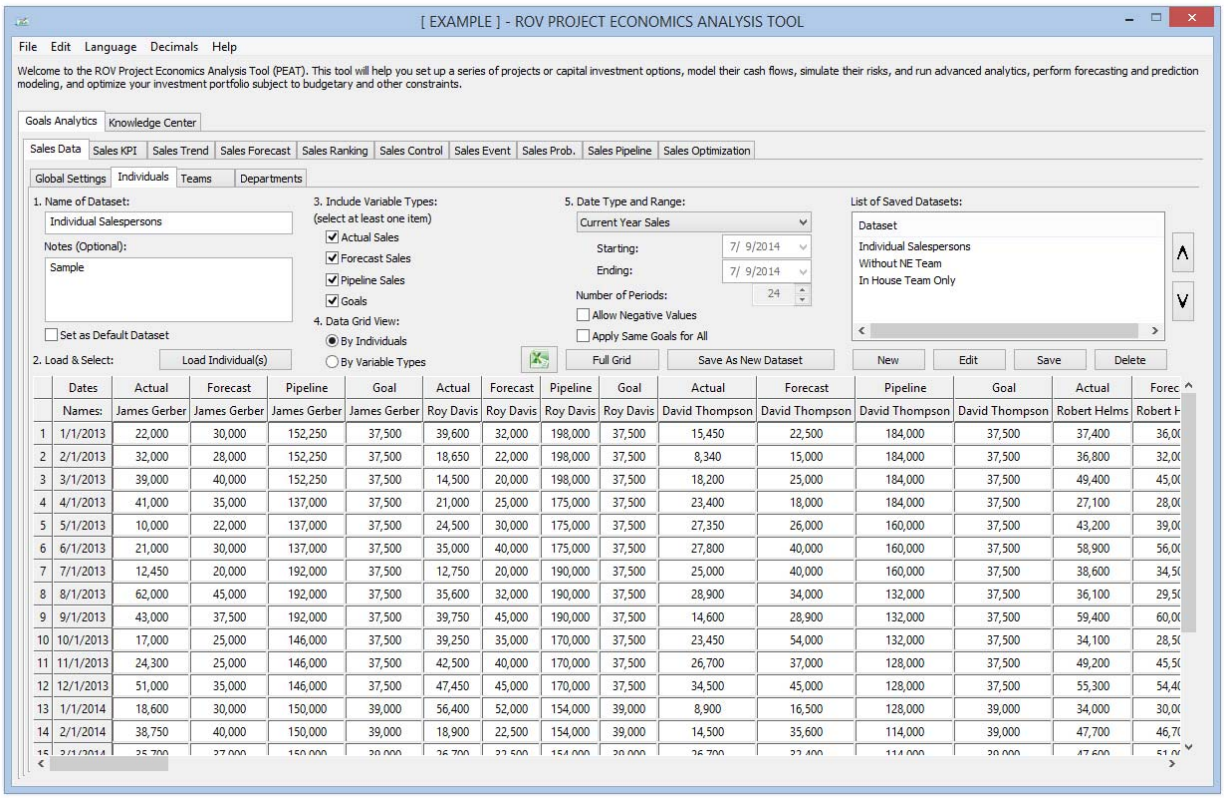


FIGURE 9 SPEAR initial data setup.

In the *Sales Data | Individuals* tab, further analysis details are selected to identify the data being included in the program. All the details have been imported, entered, or copy and pasted from SPIDER or other software applications such as Salesforce.com.

Figure 10 is a screen in SPEAR showing the detailed data from ARP by Individuals that had been in Excel format as was shown in Figure 6 but is now within the program and ready for analysis. The view shown is the Individuals tab but data may also be reviewed and summarized by Teams and Departments.



	Dates	Actual	Forecast	Pipeline	Goal	Actual	Forecast	Pipeline	Goal	Actual	Forecast	Pipeline	Goal	Actual	Forec
	Names:	James Gerber	James Gerber	James Gerber	James Gerber	Roy Davis	Roy Davis	Roy Davis	Roy Davis	David Thompson	David Thompson	David Thompson	David Thompson	Robert Helms	Robert H
1	1/1/2013	22,000	30,000	152,250	37,500	39,600	32,000	198,000	37,500	15,450	22,500	184,000	37,500	37,400	36,0
2	2/1/2013	32,000	28,000	152,250	37,500	18,650	22,000	198,000	37,500	8,340	15,000	184,000	37,500	36,800	32,0
3	3/1/2013	39,000	40,000	152,250	37,500	14,500	20,000	198,000	37,500	18,200	25,000	184,000	37,500	49,400	45,0
4	4/1/2013	41,000	35,000	137,000	37,500	21,000	25,000	175,000	37,500	23,400	18,000	184,000	37,500	27,100	28,0
5	5/1/2013	10,000	22,000	137,000	37,500	24,500	30,000	175,000	37,500	27,350	26,000	160,000	37,500	43,200	39,0
6	6/1/2013	21,000	30,000	137,000	37,500	35,000	40,000	175,000	37,500	27,800	40,000	160,000	37,500	58,900	56,0
7	7/1/2013	12,450	20,000	192,000	37,500	12,750	20,000	190,000	37,500	25,000	40,000	160,000	37,500	38,600	34,5
8	8/1/2013	62,000	45,000	192,000	37,500	35,600	32,000	190,000	37,500	28,900	34,000	132,000	37,500	36,100	29,5
9	9/1/2013	43,000	37,500	192,000	37,500	39,750	45,000	190,000	37,500	14,600	28,900	132,000	37,500	59,400	60,0
10	10/1/2013	17,000	25,000	146,000	37,500	39,250	35,000	170,000	37,500	23,450	54,000	132,000	37,500	34,100	28,5
11	11/1/2013	24,300	25,000	146,000	37,500	42,500	40,000	170,000	37,500	26,700	37,000	128,000	37,500	49,200	45,5
12	12/1/2013	51,000	35,000	146,000	37,500	47,450	45,000	170,000	37,500	34,500	45,000	128,000	37,500	55,300	54,4
13	1/1/2014	18,600	30,000	150,000	39,000	56,400	52,000	154,000	39,000	8,900	16,500	128,000	39,000	34,000	30,0
14	2/1/2014	38,750	40,000	150,000	39,000	18,900	22,500	154,000	39,000	14,500	35,600	114,000	39,000	47,700	46,7

FIGURE 10 Detailed data by Individuals.

SPEAR Analysis Options

After setup, the analysis can proceed. When the data is loaded, the organizational hierarchy and the particular elements that will be scrutinized will also automatically load. SPEAR was developed to emphasize ease of use so that a user's only qualification is not background knowledge of the mathematical and statistical intricacies that are necessary to reveal the trends and nuances present in the data, but simply and understanding of the company's products and market.

SPEAR analysis tools have different uses and should be applied as the need arises per the functionality required. The analysis tasks are divided into nine areas of focus: Sales KPI, Sales Trend, Sales Forecast, Sales Ranking, Sales Control, Sales Event, Sales Probability, Sales Pipeline, and Sales Optimization.

- Sales KPI––Individual and Team performance comparison for Efficiency, Effectiveness, Conversion, and the weighted operational index.
- Sales Trend––Individual and Team performance trending analysis of key sales elements.
- Sales Forecast––Individual and Team predictive modeling and forecasts of key sales elements highlighting changes in performance per period.
- Sales Ranking––Individual and Team Pareto sequencing and ranking of sales performance with graphical representation.

- Sales Control––Individual and Team statistical process analysis of the elements in the KPI by dollars or percentage contribution to see if dips and spikes in KPIs and sales revenues occur due to randomness and regular business fluctuations or are statistically significant and represent a structural shift in the market and sales cycle.
- Sales Event––Analysis of date-based sales support actions to evaluate worth and to test and identify the statistical effects of certain marketing and sales campaigns.
- Sales Probability––Calculates the probability of hitting goals per Individual, Team, or Department.
- Sales Pipeline––Individual and Team assessment of pipeline health, volatility, conversion, and staleness.
- Sales Optimization––Modeling construct for prediction of the best, most efficient, sales staffing thresholds in view of the probability of hitting the corporate sales goals.

Sales KPI

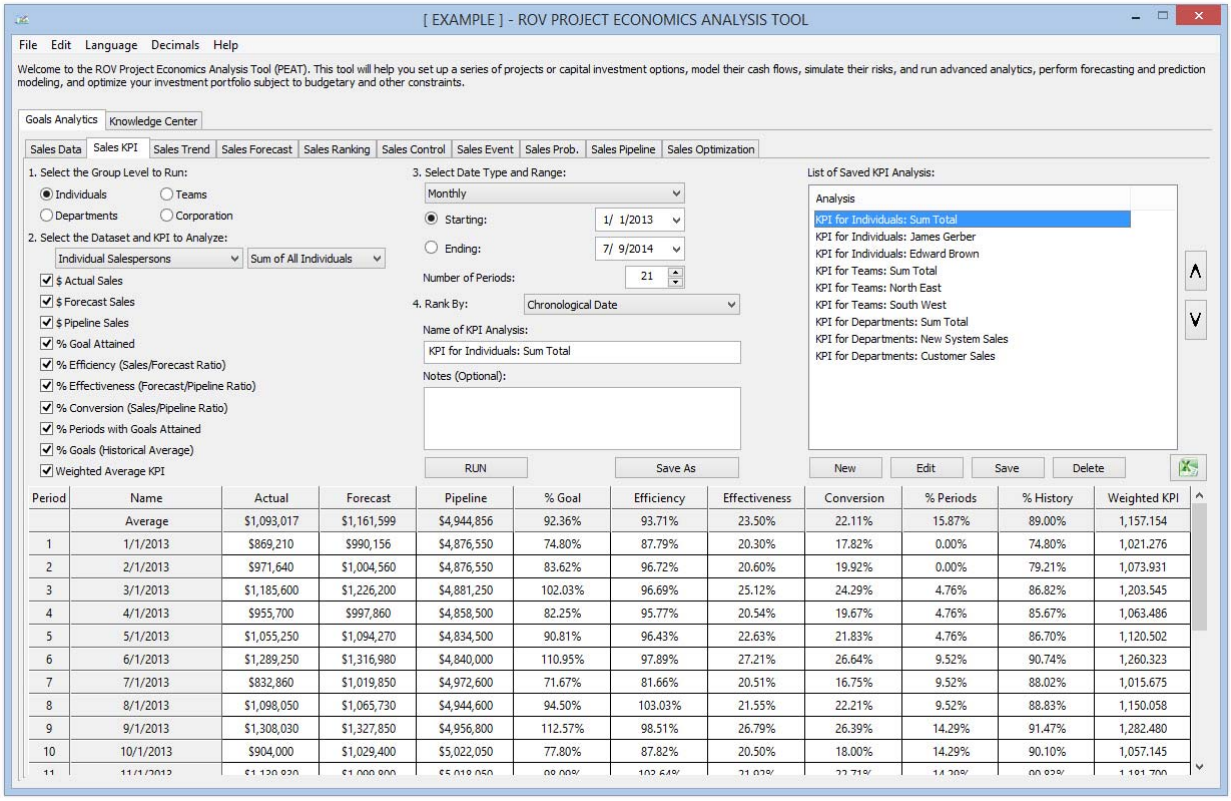
A Key Performance Indicator (KPI) is important for comparison of accomplishments across any organization in which there is more than one active supplier of results. A KPI can be unique per person or team and provides a qualifier of actual results against a number best comprising the desired goal. Efficiency, Effectiveness, and Conversion are the KPIs calculated per salesperson.

- *Efficiency* is a ratio of *Sales to Forecast*, which measures both how *accurate* the salesperson's forecast performed in advance is to actual sales that were attained, as well as assuming the sales forecast was performed with proper due diligence and represents the universe of potential sales, and how *efficient* the salesperson is in closing all the forecast sales opportunities within the specified period. Clearly, the higher the efficiency ratio, the better the salesperson or sales team.
- *Effectiveness* is a ratio of *Forecast to Pipeline*, which measures how much of the sales pipeline (conceivably the entire known universe of potential clients, both current and future, that have been identified as potential candidates to purchase the company's products and services) the salesperson or sales team predicts it can *effectively* capture and convert during the specified period. Clearly, the higher the effectiveness ratio, the better the salesperson or sales team.
- *Conversion* is a ratio of *Sales to Pipeline*, which measures how many of the sales in the pipeline were closed as actual sales. Clearly, the higher the conversion ratio, the better the salesperson or sales team. If the conversion ratio is close to or equals the effectiveness ratio, this also indicates that the efficiency ratio is high (specifically, the ratio of conversion to effectiveness is equal to the efficiency KPI).

Using these KPIs, sales management is able to understand the relative value of each individual and team based on real reported and accomplished results.

Figure 11 is an ARP example of the total sales results for all the sales staff by period. Goals HQ has created several operational indices for judging sales success that are shown in this screen. First, the actual numbers per period across the horizontal rows for Actual Sales, Forecast, Pipeline, and the Sales Goal (shown as a percent of Actual) are shown. Then the ratios of Efficiency, Effectiveness, and Conversion are displayed. These ratios, which are shown as percentages, will vary by client, but their comparisons between periods provide ARP an indication of the rate of transition of prospects to

customers. The KPI number provided in the far right column is determined by the formula of weightings as selected in the Sales Data screen (Figure 9) and the actual results for the period.



Period	Name	Actual	Forecast	Pipeline	% Goal	Efficiency	Effectiveness	Conversion	% Periods	% History	Weighted KPI
	Average	$1,093,017	$1,161,599	$4,944,856	92.36%	93.71%	23.50%	22.11%	15.87%	89.00%	1,157.154
1	1/1/2013	$869,210	$990,156	$4,876,550	74.80%	87.79%	20.30%	17.82%	0.00%	74.80%	1,021.276
2	2/1/2013	$971,640	$1,004,560	$4,876,550	83.62%	96.72%	20.60%	19.92%	0.00%	79.21%	1,073.931
3	3/1/2013	$1,185,600	$1,226,200	$4,881,250	102.03%	96.69%	25.12%	24.29%	4.76%	86.82%	1,203.545
4	4/1/2013	$955,700	$997,860	$4,858,500	82.25%	95.77%	20.54%	19.67%	4.76%	85.67%	1,063.486
5	5/1/2013	$1,055,250	$1,094,270	$4,834,500	90.81%	96.43%	22.63%	21.83%	4.76%	86.70%	1,120.502
6	6/1/2013	$1,289,250	$1,316,980	$4,840,000	110.95%	97.89%	27.21%	26.64%	9.52%	90.74%	1,260.323
7	7/1/2013	$832,860	$1,019,850	$4,972,600	71.67%	81.66%	20.51%	16.75%	9.52%	88.02%	1,015.675
8	8/1/2013	$1,098,050	$1,065,730	$4,944,600	94.50%	103.03%	21.55%	22.21%	9.52%	88.83%	1,150.058
9	9/1/2013	$1,308,030	$1,327,850	$4,956,800	112.57%	98.51%	26.79%	26.39%	14.29%	91.47%	1,282.480
10	10/1/2013	$904,000	$1,029,400	$5,022,050	77.80%	87.82%	20.50%	18.00%	14.29%	90.10%	1,057.145

FIGURE 11 Selection and weighting of KPIs.

Sales Trend

The time-series trend within the elements of sales performance provides management a map of sales direction and velocity, and an understanding of the rate of success or lack thereof. Any element of sales performance can be included or excluded to isolate and zoom in on significant issues that may be affecting particular sales individuals or teams. The information is then graphically displayed for a real-time view of the past to present sales status.

Figure 12 is an example of ARP Actual Sales with the chart showing 21 months of information. The accumulation of data for multiple periods adds to the value of the analysis by allowing the significance of the fluctuations between periods to become apparent. ARP's example shows that quarterly period-ending months have a predominately higher sales figure. Therefore, management's tasks for increasing sales would be best focused on what actions would increase sales in the first two months of each quarter.

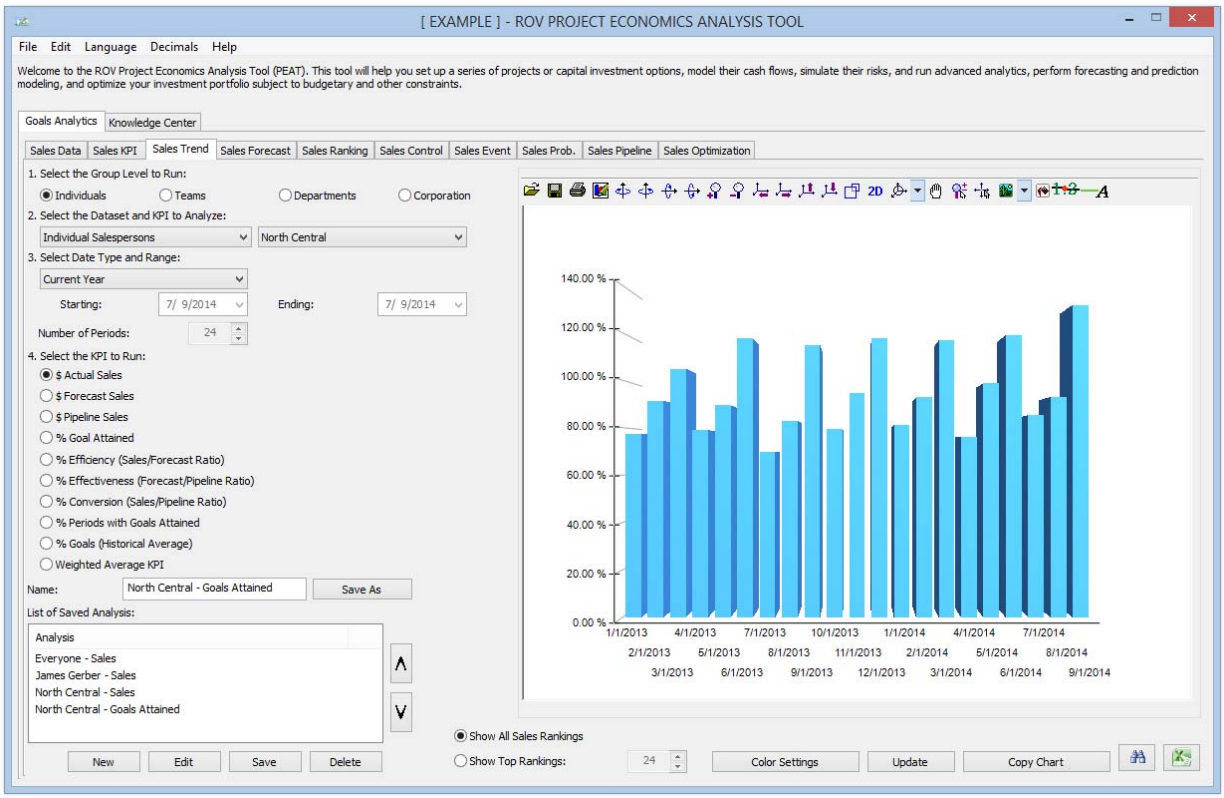


FIGURE 12 Selection of sales elements for graphical display of sales trends.

Sales Forecast

Sales Forecast is the examination of the change occurring per period within the forecasts of individuals or teams. The time-series data for sales performance are combined and charted for analysis. The importance of the review is to understand what progress is being made in the market by the sales team towards growing the market share or success level. The software applies a variety of ROV forecast methods (e.g., ranging from ARIMA, Basic Econometrics, GARCH, and Nonlinear Multivariate Regressions, to Combinatorial Fuzzy Logic, Neural Networks, Stochastic Processes, Trend Analysis, and Time-Series Decomposition). The algorithms use self-selection by applying historical data to backcast and backfit existing sales or KPI data, and then uses the best-fitting model to predict and forecast the future. Clearly this approach is much more powerful than management guesstimates as it employs historical data on sales and sales performance metrics, applying advanced analytics and Monte Carlo risk simulations of thousands of scenarios and returning results with confidence intervals and probability distributions.

Figure 13 is an example of ARP Forecasts totaled for all salespersons and displayed graphically for 21 consecutive periods with a backcast and forecast model. The selection criteria in the screen determines the presentation of data by Individual, Team, or Department, or for the entire company. The user can choose the computational criteria (e.g., sales elements, periodicity, and groupings) to forecast. The chart reveals increasing trends for ARP Sales Forecasts and for Actual Sales. After seeing this chart,

the task of ARP Sales Management would be to learn why forecasts increase for the third month per quarter but remain lower for the first two months.

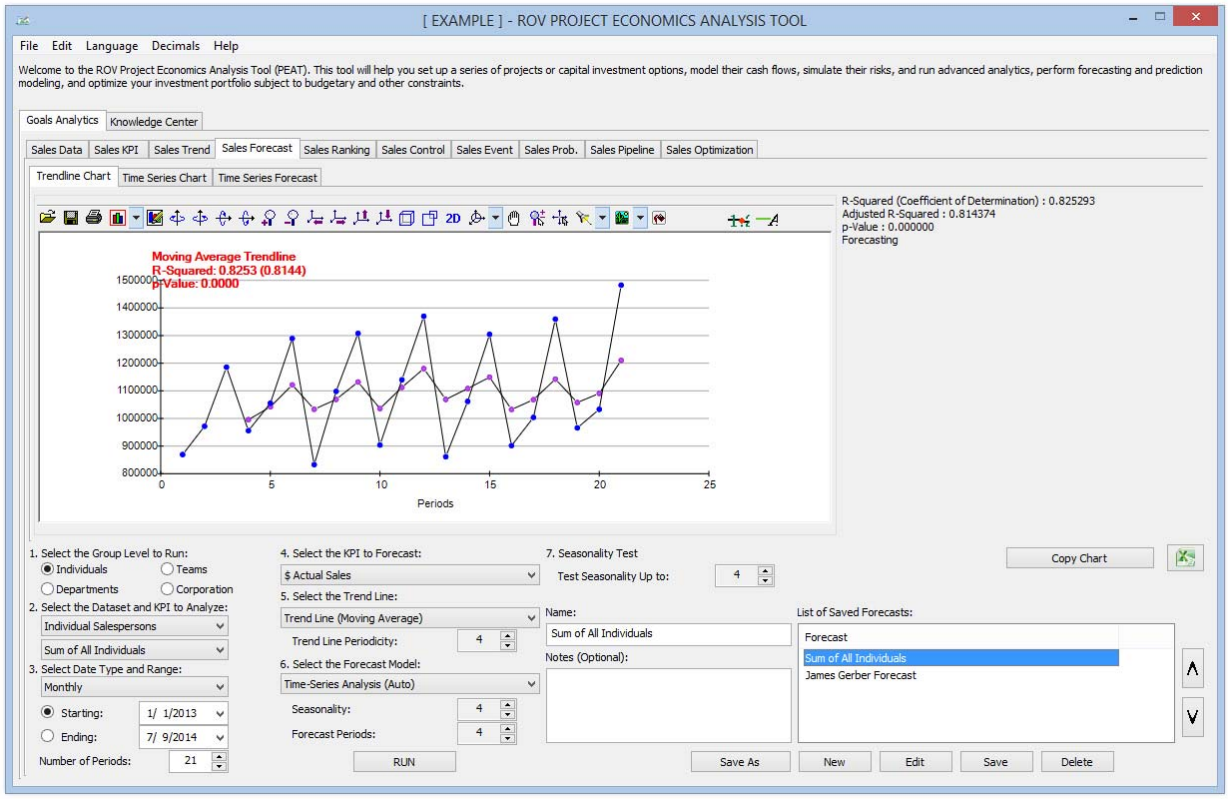


FIGURE 13 Selection and graphing Sales Forecast variations.

Sales Ranking

Sales management needs an accurate identification of the most successful and least successful individuals within the sales force. Rewards can then be provided based on real performance, and the best contributors can be presented as role models for the rest of the team to emulate. Ranking provides a graphical depiction of results after sequencing the performance of individuals or teams.

Figure 14 is an example of ARP sales ranking for the top 10 salespersons across all sales territories. The selection criteria in steps 1–4 provide the identification of data for analysis, and step 5 involves selecting the methodology for display of the results. In this ARP example, the user has selected to show the top 10 rankings and depict the same in the format of bubble and bar charts. These alternative methods illuminate the achievements of the star contributors and show their relative relationship in contributions. Obviously, these are the salespersons who should be emulated by the rest of the sales team, and their factors for Efficiency, Effectiveness, and Conversion are particular indices of how they make the numbers that they do.

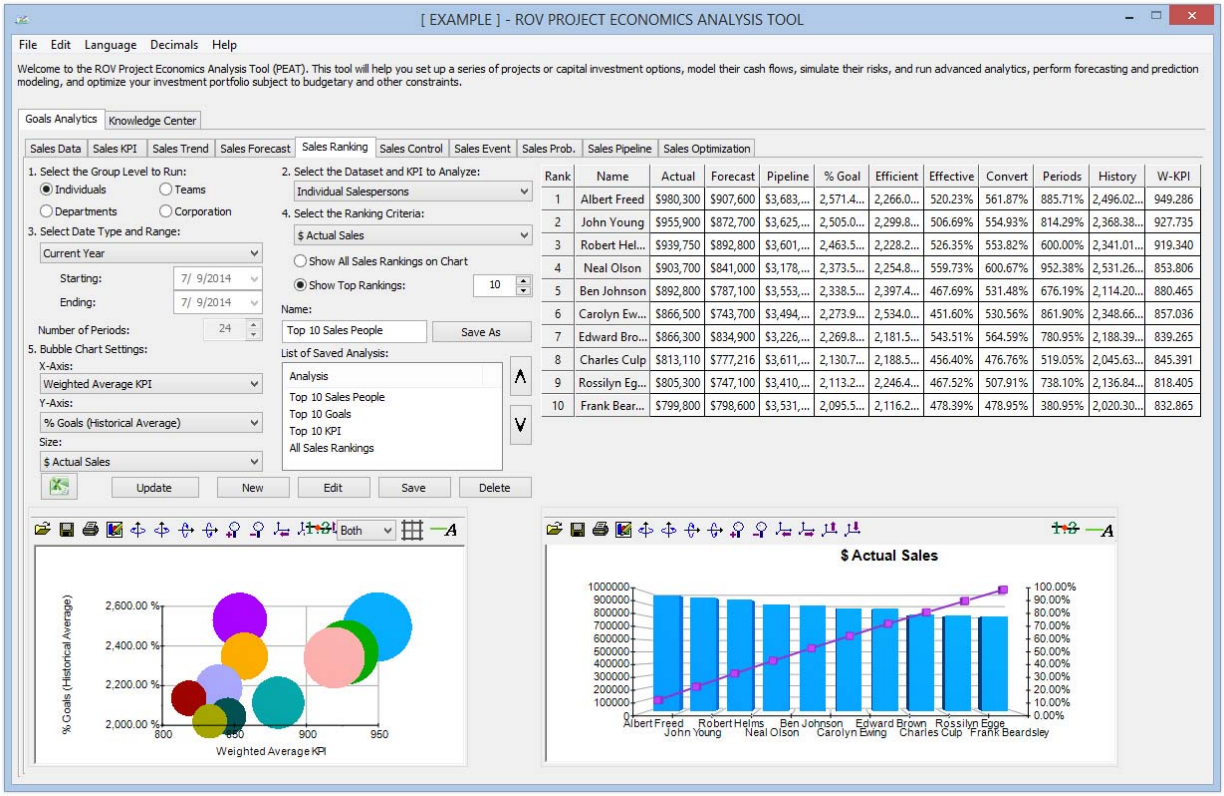


FIGURE 14 Selection and Ranking of Best or Worst Performers.

Sales Control

Sales Control is a tool for examining the fluctuations and volatility within a specific team's or individual's performance over time. End results per period do not always tell the correct story of how sales staff approach the accomplishment of their sales goal. Variations between periods can be related to the time or position in the quarter or position within a fiscal year that are deemed most relevant to sales staff. Sales management needs to know if motivation for performance lags in particular periods and who amongst the sales team is best and worst in performance.

A Statistical Process Control analysis and control chart are employed on the time-series of historical and current sales and sales performance KPIs to determine if any spikes or valleys (i.e., extreme events where sales are suddenly at a low point or experienced a sudden and immediate increase) are entirely random, given the volatile history of the KPI, or can be deemed as a statistically significant event, signifying that intervention may be required (e.g., start of an economic downturn, a structural shift in the market with some new competitive entrant, etc.).

Figure 15 is an example of the Sales Control screen selected for all salespersons and for 21 periods of historical and current results. The selection options shown in steps 1–4 provide the user the ability to pick the data set summary level to be reviewed and the charting type desired. In the case shown in Figure 15, the volatility of ARP sales is charted using a Statistical Process Control chart for sales totals. What the graph indicates is that ARP sales are fluctuating within 1 sigma of variance for 13 of the 21 periods reported. This may be considered an allowable fluctuation, but the other 8 periods are a

different matter and specific occurrences that can be isolated should be reviewed for these other, out of bounds, periods. In fact, 3 of these periods are positive but the remaining 5 periods are negative.

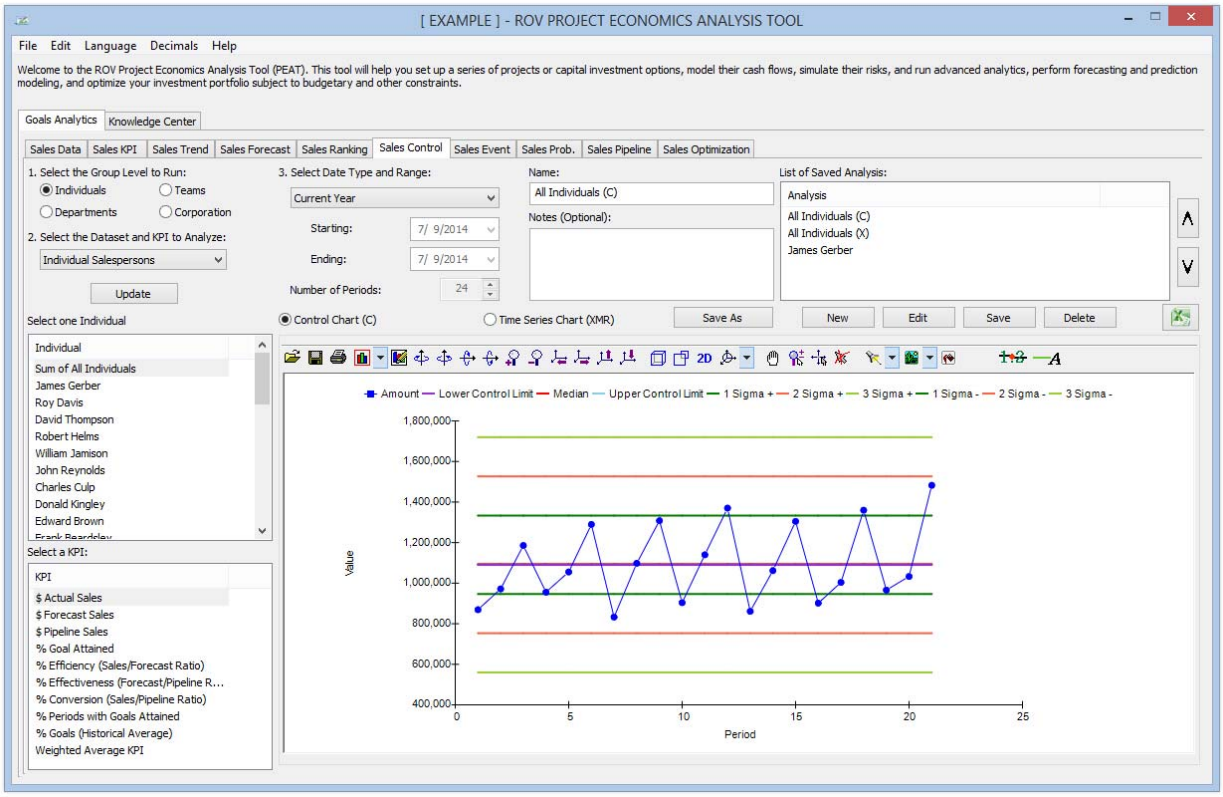
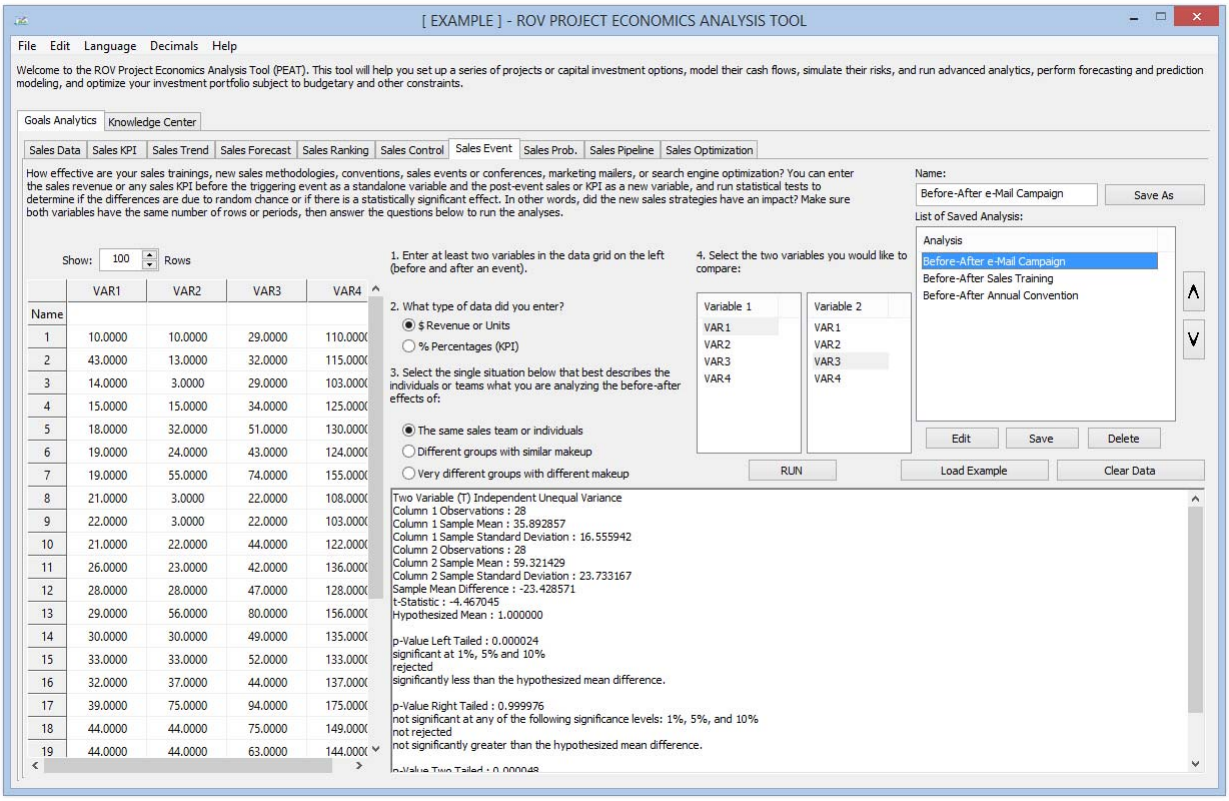


FIGURE 15 Selection and Computation of Sales Volatility.

Sales Event

How effective are your sales trainings, new sales methodologies, conventions, sales events, conferences, marketing mailers, or search engine optimizations? You can enter the sales revenue or any sales KPI before the triggering event as a stand-alone variable and the post-event sales or KPI as a new variable and run statistical tests to determine if the differences between the two variables are due to random chance or if there is a statistically significant effect. In other words, did the new sales strategies have an impact?

Figure 16 is an example of the Sales Event screen populated with ARP data for multiple salespersons (each salesperson's data is entered as a row). The data set loaded was for actual sales results for a certain number of periods before and after sales training was given to the group. The analysis revealed that no significant changes in sales were seen and, therefore, the sales training provided cannot be judged as being helpful in increasing sales. Obviously, the benefit to ARP is knowing whether or not investments of this nature are helpful for increasing sales because this analysis is a good *proof of concept test* to see if a certain event or sales training is worth its cost.



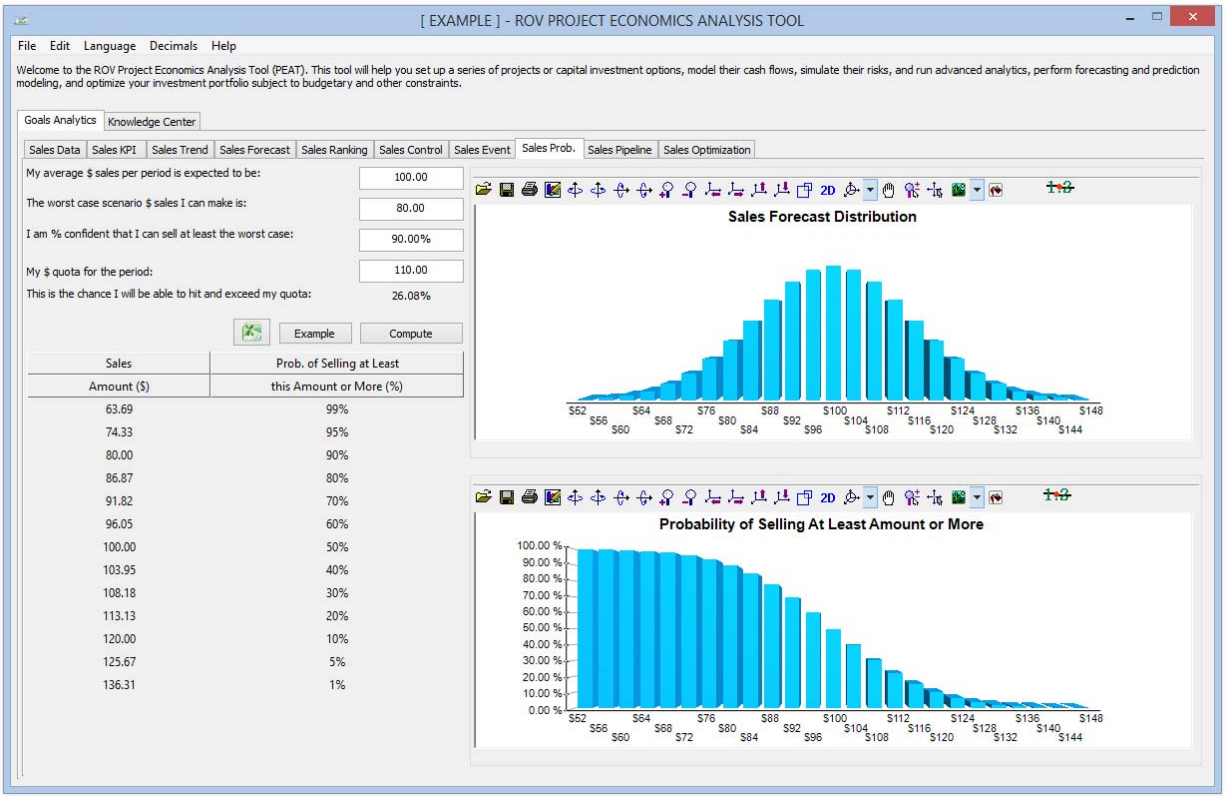
Name	VAR1	VAR2	VAR3	VAR4
1	10.0000	10.0000	29.0000	110.000(
2	43.0000	13.0000	32.0000	115.000(
3	14.0000	3.0000	29.0000	103.000(
4	15.0000	15.0000	34.0000	125.000(
5	18.0000	32.0000	51.0000	130.000(
6	19.0000	24.0000	43.0000	124.000(
7	19.0000	55.0000	74.0000	155.000(
8	21.0000	3.0000	22.0000	108.000(
9	22.0000	3.0000	22.0000	103.000(
10	21.0000	22.0000	44.0000	122.000(
11	26.0000	23.0000	42.0000	136.000(
12	28.0000	28.0000	47.0000	128.000(
13	29.0000	56.0000	80.0000	156.000(
14	30.0000	30.0000	49.0000	135.000(
15	33.0000	33.0000	52.0000	133.000(
16	32.0000	37.0000	44.0000	137.000(
17	39.0000	75.0000	94.0000	175.000(
18	44.0000	44.0000	75.0000	149.000(
19	44.0000	44.0000	63.0000	144.000(

FIGURE 16 Data for analysis of Event effectiveness.

Sales Probability

Your sales department, team, or individuals have just submitted their sales forecasts for the next few periods just as in the past, and corporate management wants to know the true likelihood that the forecasts submitted will be accomplished. The Sales Probability analysis allows for entry of past average performance to approximate and model the probability for success. The probability distribution outcomes are charted and a probability table is provided for further interpretation.

Figure 17 is an example of ARP sales data graphically depicting the probability that a sales goal will be achieved. The screen is designed for an interactive session for the LA using the sales projections of the sales staff. The sales forecast is entered along with the confidence level for attainment. The program calculates the cumulative probability of sales thresholds and charts the normal curve distribution. Both methods of calculation reveal sales potential and probability. In the ARP case, the percent confidence and the minimal variance between the actual forecast and the confidence level have yielded charts in which the sales probability is a clear example of how reality seldom follows commitments prior to the event. The most telling is the *Probability of Selling At Least Amount or More* chart. It is a reminder that forecasts must be factored before management decisions or financial forecasts are given to investors.



Sales Amount ($)	Prob. of Selling at Least this Amount or More (%)
63.69	99%
74.33	95%
80.00	90%
86.87	80%
91.82	70%
96.05	60%
100.00	50%
103.95	40%
108.18	30%
113.13	20%
120.00	10%
125.67	5%
136.31	1%

FIGURE 17 Probability that sales projections will be attained.

Sales Pipeline

Sales pipeline analysis allows you to enter the potential market and sales target opportunities over time and track how the sales pipeline is progressing (turnover rates, pipeline staleness, velocity and movement, growth, seasonality, etc.). Users start by setting the periodicity (we recommend the same periodicity going forward for better comparison) and entering the required pipeline data (Figure 18). Users then save the pipeline and keep adding pipelines for analysis and comparison over time.

Figure 18 is an example of ARP data for pipeline analysis (i.e., Pipeline Data tab). This area of sales is a significant precursor to success but is often the most overlooked aspect of sales development. The screen example for ARP shows the pipeline for just one salesperson. Each prospect is listed and the status of each is tracked as they are converted to customers or if the prospect is lost. The data grid alone is indicative of the activity of a salesperson. Pipelines should change over time with prospects discovered and added while others are deducted from the list because they were won or lost. For prospects to stay in the pipeline excessively long would indicate that either they are not truly a prospect or that the salesperson is possibly not working on converting them. This screen's data feeds the subsequent tab, *Pipeline Analysis*, which is not shown in this review (the charting of pipeline volatility). This chart is of similar construction to the other time-series charts in the program.

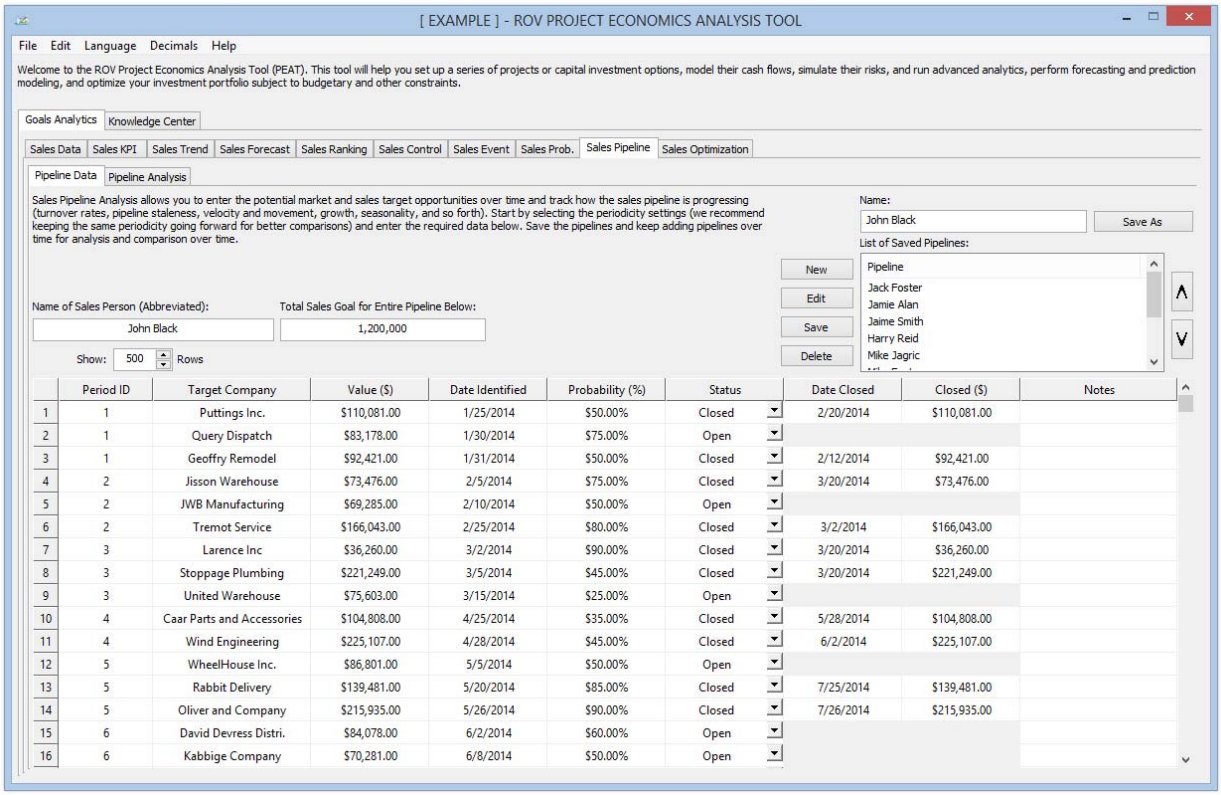


FIGURE 18 Comparison of the pipeline data per sales individual.

Sales Optimization

What is the probability your company will hit and exceed the targeted sales goals this period? Should you revise your sales targets to something more realistic (reduce the goals for a higher probability of attainment)? Should you add additional sales associates to help increase your chances of hitting the target (i.e., is the higher cost worth it)? Enter the typical salesperson's worst-case, most-likely, and best-case sales amounts; the targeted corporate sales goal; and the total number of sales associates available currently, and then run a Monte Carlo risk simulation to see your chances. In addition, the levels of diminishing marginal returns can be determined. That is, adding additional sales staff in theory would allow the company to sell more, but market saturation can occur, pipelines can overlap, internal sales competition can happen, and sales cannibalization of product lines can develop. With additional sales staff, the chances of hitting the company's sales goals increase, but at a decreasing rate. Therefore, sales optimization analysis looks at the nonlinear cost and return trade-offs. For example, hiring an additional salesperson may increase the probability of achieving your goals by 10%, but hiring a second person may only increase it by 17% (instead of 20%), and a third by only 22% (instead of 30%). And if the second new salesperson will increase the total probability of achieving target at a 99.9% chance, hiring the third, fourth, or fifth person really does not contribute much if all that is required is that the sales target be attained, but the additional hires will cause the total costs to skyrocket (in fact, this action may even cause a spiraling effect of requiring an upward adjusted sales goal to cover the higher operational costs of the company).

Figure 19 is an example of the Sales Optimization screen with ARP data. The screen is interactive allowing the user to play *what-if* staffing games. The charts show the Simulated Sales Forecast for ARP with the probability declining as the sales projection increases. How much risk does ARP Sales Management want to take with upper management? The *Standard Analysis* tab reveals forecasts that are achievable and risk can be known. Included in the screen is the *Simulated Probabilities of Achieving Target* chart that shows the staffing necessary based on actual productivity. For ARP, the chart indicates that sales probability jumps to 100% between the staffing levels of 9 to 11. Certainly it is not possible to instantly add sales personnel at will to meet the sales goals of the company, but it is necessary to see productivity calculated as a component of average staff productivity. Working in this tab also allows sales management to understand the capability of the company's staff and initiate any staff requests with firm numbers for productivity.

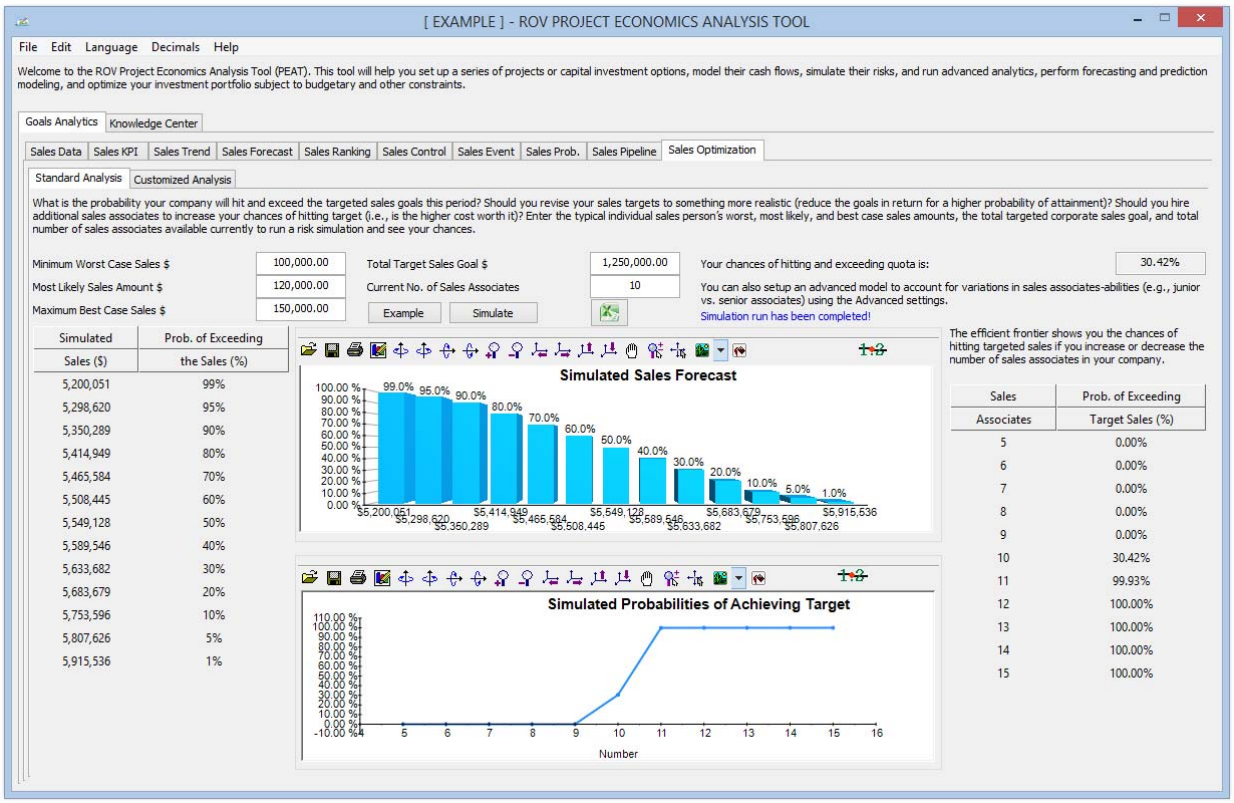


FIGURE 19 Sales actuals against computed future sales outcomes.

Figure 20 is an ARP example of *Customized Optimization* with functionality for optimization analysis of the sales performance for particular salespersons. The *Customized Analysis* tab is a variation of the *Standard Analysis* tab. The *Customized* tab models sales teams or departments individually, with unique sales capabilities. For example, an individual salesperson's historical or anticipated performance for *worst-case*, *most-likely*, and *best-case* scenarios can be entered, Monte Carlo risk simulation is run, and the results are charted to show the cumulative probabilities of hitting given sales targets. The results of Figure 20 for ARP indicate that given the assumptions of the sales team, there is a 99% confidence that ARP can sell at least $1.42M, an 80% confidence of selling $1.54M, and less than a 5% confidence of exceeding $1.73M in sales that particular period.

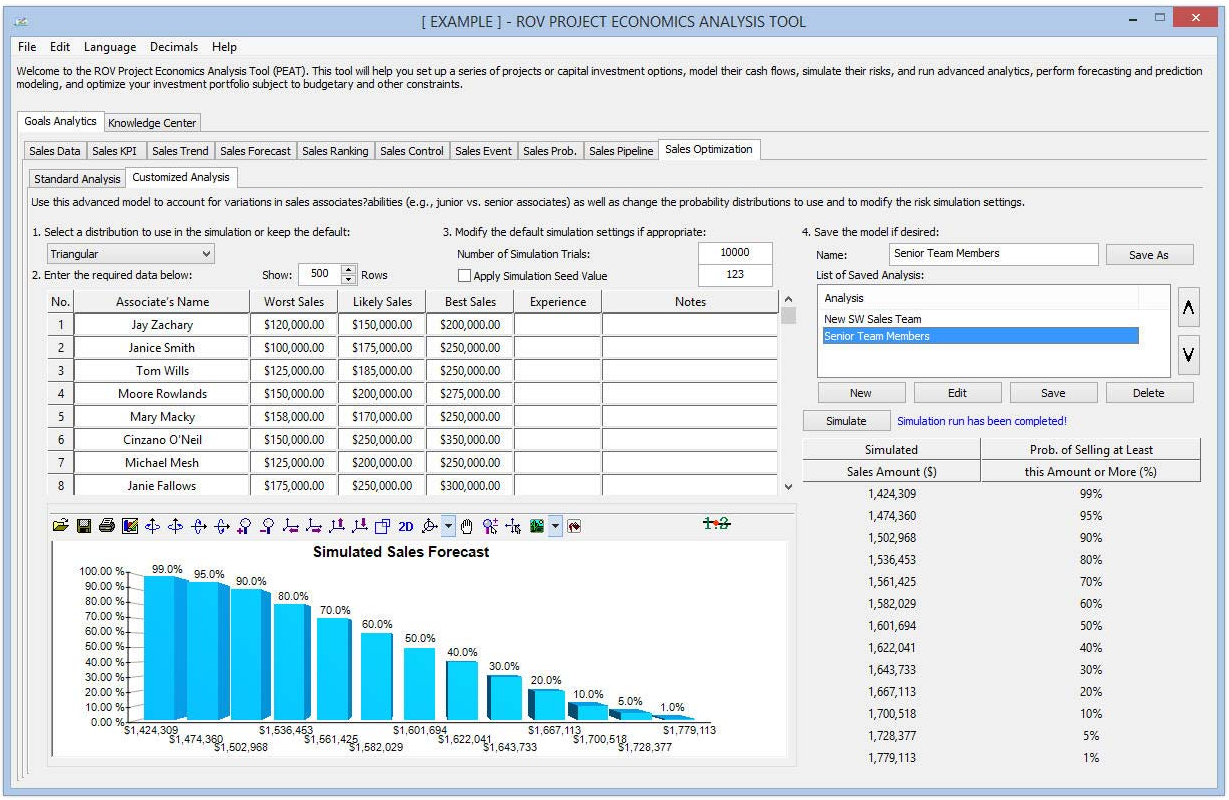


FIGURE 20 **Sales actual potential with customized probability settings.**

Conclusion

The combination of SPIDER and SPEAR is intended to provide a comprehensive service in assisting sales performance analysis for any organization seeking to improve sales and to also better understand the nuances that are unique to its products, markets, and sales staff. The overall goals of the service are significant and varied: to demystify the profession of sales, to provide actual improvement per sales staff member, to reveal the inhibitors and facilitators of good sales practice, and to alert management to sales performance trends and risk thresholds on a timely basis. All of these goals lead to a better understanding of present risks based on quantifiable metrics. Where SPIDER is the facility to drive improved sales and smoother communications of sales status, SPEAR is the facility for understanding the characteristics of the company's sales performance.

The benefits of SPEAR can be applied to compensation, hiring, severance, and the overall communication of sales information to all interested parties, including board-level oversight, C-level management, and the operational management tasked with fulfillment of sales plans.

For ARP, the use of both products has provided significant value. Its cost to use SPIDER has been repaid with a sales force completely knowledgeable of their sales goals and a sense of urgency for accomplishment. Compensation has been adjusted to recognize performers with consistent sales for all periods per quarter, and the star contributors have been recognized as model sales staff for all sales departments to emulate. Needless to say, the habitual underperformers have been identified and

actions taken to address their issues or remove them from their role in sales. Overall, ARP claims a significant sales growth for which they credit the use of Goals HQ analytics.

The value of SPEAR is part and parcel of the overall results. ARP's upper management is now more comfortable with the forecasts received since they are backed by the analysis of SPEAR. Sales-related costs are more carefully invested, and investment has actually increased since the *Event* analysis provides real understanding of effectiveness of certain marketing campaigns and sales efforts. The concept of sales surprises has been virtually removed since the trend analysis can predict end results more accurately than intuition. Surprises still occur but they are generally positive with the capture of a few *blue birds* from time to time. The human element is not ignored through any of the analysis now available to the sales management staff, but the ability to now ask pertinent questions and see real-time reports juxtaposed with historical data and then modeled by the SPEAR tools has removed the adversarial relationship between field and in-house staff.

Sales can be the most exciting aspect of a company's operations. The fulfilling nature of adding new customers or new revenue to the firm and winning the battle of ideas for a company's products should be one of the most satisfying tasks that any employee can have. SPIDER and SPEAR are two tools matched to the profession of sales for the salesperson and for his or her sales management.