

Contact Center Enterprise  
Analytics: Advances in Decision  
Technologies Enable a Whole  
New Class of Contact Center  
Analytics

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## The promise

During the late 1980's, the promise of computer systems that would make decisions for us was all the rage. Artificial intelligence and decision support algorithms utilizing differing systems of logic were being researched and taught at all of the best engineering programs. There were many stories in the popular press (and even in movies) of how this promise would change everybody's lives. Boolean logic, fuzzy math, recursive searches, neural networks, and genetic algorithms (just to name a few terms), entered the popular lexicon in the ensuing years. The "computer as another brain" was a graphical cliché.

But this promise has not been kept. While complex decision-making has been greatly enhanced by improvements in data viewing technologies (e.g. fighter pilots use AI to intelligently narrow the scope of uncertain threats), the role of decision-maker still rests with humans. With all this promise, and all of the research associated with intelligent computer systems, the one thing that has not changed is this: real insight is the realm of the human and analytics still require analysts.

Twenty-odd years ago we got the premise of the promise wrong. With the myriad of trade-offs and preferences, humans have predictably determined that the role of the computer is not to make decisions for us; we quite enjoy making decisions for ourselves.

The grand promise should have been somewhat less grand: the proper purpose of computers should be as an aid to decision-making. A more beneficial, realistic, and natural promise is to use the power of computers and mathematics to make plain, clear, and tangible the expected results of each of our decision alternatives long before we actually choose one.

It is this promise – a promise of real decision support – that can, and is now, being met.

## Tactical analytics in the contact center industry

In the contact center industry, the role of analytics and computer-aided decision-making has been traditionally narrow in scope. Contact center analytic systems serve a few focused purposes, primarily data capture and data presentation, in order to solve very tactical and mostly low level (but important) problems. For example:

- *Business Intelligence* tools serve to allow analysts to organize and manipulate contact data easier and faster. These are primarily data presentation tools and work well to allow the smart analyst to glean information from many disparate sources. They are good reporting tools.
- *Speech Analytic* systems serve to provide insight into the huge volume of call center voice data in order to allow natural, spoken language to be recorded and analyzed. The most common purpose for a speech analytics tool is to discern common and complimentary phrases uttered by customers for use in marketing messaging, product placement, quality assurance, or agent training purposes.

- *Performance Management* systems serve to allow agents and supervisors to monitor and to benchmark their performance relative to their peers. By scoring agents against the norm, or against their predetermined operational goals, agents can “self-correct” their individual performance and supervisors can gain insight into team performance for training purposes.
- *Workforce Management* systems serve to improve the tactical performance of contact center organizations. These decision support systems have been, until recently, the closest thing to a “big picture” view of the contact center operation. Workforce management algorithms look at the collective value of contact center agent performance and help managers organize their work and workers.

Each of these systems help analysts solve specific business problems. However, none of these contact center analytic tools have kept the promise of the truly intelligent decision support computer. They do not serve to improve strategic decision-making across the enterprise.

## The strategic decision-making cycle

How and why do executives make strategic decisions in contact centers? What is the standard process?

The contact center operation, like most operations, is 90% reactive and 10% proactive. While executive driven improvement initiatives are common (e.g. introduction of new technologies or other cost savings ideas), the vast majority of decisions are born out of necessity; they are reactive decisions to changes in the operating environment of the contact center network.

Because of this, the decision-making process is typically:

1. *Monitor the operation.* Operational analysts have reports, forecasts, budgets and other ways to determine whether some operating conditions (e.g. handle times or contact volumes) have changed or are outside acceptable parameters.
2. *If there is a change, determine the range of likely scenarios.* There is a reason that forecasting is considered an art. Given the uncertainties associated with a changing operational or business environment, it is up to the forecasting team to stick their neck out and say “here is where I believe we will come in.” However, the better forecasters will actually stick their neck out less and say “it could be X, Y, or Z.” Determining the set of possibilities will lead to the best business decisions.
3. *Develop new plans for all scenarios.* Each scenario must be vetted and the resulting business plan (the decision) is determined.
4. *Decide and Implement.* Simple.
5. *Repeat.*

## The contact center decision support ideal: A crystal ball

So what does the promise portend for the contact center community? What is the contact center decision support ideal?

Ideally, a decision support tool for contact centers would mimic the steps of the decision-making cycle; an intelligent decision support system for contact centers would help contact center executives answer specific and important business questions at every stage of the decision-making process. It would serve as the executive's "crystal ball" and would help decision-makers understand the operational and financial risks and trade-offs of their business alternatives.

Decisions like, "Handle times are creeping up, what should we do?", or "Should we open or close centers?", or "What is the effect of combining email agents with phone agents?", or "Service is slipping, should we outsource technical support?" Are all business questions that are in the realm of this ideal.

For contact centers, this crystal ball would need to be:

- *Comprehensive in Scope*: Such a system requires analysis that includes overall costs and, more importantly, an accurate view into the relationship between financial and enterprise-wide operational performance.
- *Enterprise-Wide*: Similarly, such a system, unlike most spreadsheet business analyses, would need to treat the network as it is designed or the contact routing scenario is envisioned. For example, extrapolating a simple analysis of one center, on one specific day, to imply network performance is simply not good enough.
- *Long-Term/Strategic*: Often contact center analyses fail because they are simplified to a "point in time" (this is a particular problem with using workforce management systems to provide what-if analysis). In order for decision analysis to be truly accurate and robust, it must include analysis over the effective decision time horizon. For example, a decision to open or close a center will affect more than a single week in time – it will have an impact on operational performance for a long time, months or years. Also, a single week analysis ignores the real complicating issue of contact center seasonality and this must be included in any comprehensive what-if analyses.
- *Quick and Provably Accurate*: We rely too often on analytic methods that have never been proven accurate for our business environment. Using workload calculations or Erlang equations for determining staffing requirements is straightforward, but not accurate. In order for contact center executives to be confident in their decision technologies – and the resulting decisions – these systems must be proved accurate and reliable. Accuracy is the bare minimum requirement for an analyst to have a seat at the decision-making table. Similarly, technologies or decision-making processes that take too long are simply unusable.

- *Flexible/Robust*: While no decision support system will be able to answer every single business question, a true decision support tool must provide a framework for answering those most critical business decisions. This crystal ball must not be too specific or narrow in scope.
- *Able to Analyze Business Risk*: Understanding the operational and financial trade-off also implies the ability to model operational or financial business risk. Oftentimes, a business focuses decisions on expected costs or expected benefits, not the probabilities associated with those costs or benefits, i.e. they ignore business risk. This is a mistake.
- *Actionable*: Real-world impact requires an analytic tool and process that yields practical results, and it requires a business process that is geared toward action and not just discussion.

## Enter enterprise analytics

*Enterprise Analytics is the application of specialized decision technologies to contact center performance monitoring, forecasting, scenario development, plan development and evaluation, business risk analysis, and ultimately, strategic decision-making.*

Over the last ten years, “new” and distinct mathematical modeling technologies, coupled with improvements in computer processing speed, have enabled more sophisticated contact center analytics.<sup>1</sup> While most of these modeling methods have grown up independently of each other, they derive their “super model” power by working in conjunction; it is these technologies that enable huge improvements in decision-making for contact centers. These include data warehousing, forecasting, discrete-event simulation modeling, and mathematical optimization (integer programming) technologies.

These technologies, used together with a strong business process improvement orientation, enable the development of an Enterprise Analytics business process. There are four such technologies/processes:

### ***1. Automated forecasting and its appropriate role***

In many, if not most, organizations, the role of forecasting is both simple and very narrow: to determine the expected contact volumes and handle times accurately. It is narrow because contact volumes are neither the only nor the most important business driver to forecast. It is simplistic because the true value of a forecasting team is not a single forecast, but is a part of a contact center monitoring system and a larger planning process.

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<sup>1</sup> Kosiba, R. (2007). *Welcome to the Decision Decade: The Time for Contact Center Decision Support is Now*. White Paper.

Leading analytic organizations recognize this. They view forecasting differently:

- They view forecasts as the baseline and variance to forecast as a warning indicator to understand. They worry less about forecasting “error”; they instead assume that any variance to forecast is either natural variability of the business or a change in the environment that needs to be explored. For example, if absenteeism is higher than expected, it is a warning that something else has changed in the operation.
- They automate forecasting so they can apply forecasting expertise to every important contact center metric. Call volume forecasts are important, but so are handle time forecasts, attrition forecasts, sick time forecasts, training plans/forecasts, vacation plans/forecasts, wage rate forecasts, etc... It is essential to make this forecasting process as easy as possible, to allow for the use of sophisticated forecasting methodologies of these other important items.
- The best forecast does not necessarily mean the lowest “error.” Standard methods of determining forecast error are helpful, but not necessarily the best way to judge between competing methodologies. The final downstream product of the forecast is a set of decisions and the forecast that produces the best decision is the better forecast. When viewing competing forecasting methodologies against hold-out data, the best forecasters take the next logical step and ask, “which methodology poses the most operational risk to the organization?” Oftentimes, it is not the methodology with the lowest Root Mean Squared Error (RMSE) or absolute error.

There are a myriad of mathematical technologies available to forecasting analysts; however, the most important item to consider is that the data stream being forecasted matches well with the mathematical methodology chosen.

But often, contact center executives can improve their forecasting process by simply reminding their forecasters that the purpose of the forecast is to make decisions, and to focus their analytic team on that direct purpose. Which forecasting methodology will yield the staff plan with the least amount of risk?

## ***2. Automated variance analysis***

Variance analysis is usually used in the context of budget analysis. That is, variance to budget is an item explored but only if line item costs are too high. This is clearly short-sighted. In contact center operations, variance to plan should be regularly analyzed to certainly include costs, but also to include all major assumptions associated with the strategic operating plan. This includes (by center and staff group), wage rates, handle times, volumes, vacation plan, employee attrition etc.

Variance to forecast for each of these items should be investigated for:

- *A Mistake*: Was there a math error when developing the forecast?
- *Root Cause*: What is the reason, internally (the operation) or externally (the market environment, for the variance?)

- *Permanence*: Is this variance expected to be part of a long-term trend or is it a single event?
- *Manageability*: Can the operation control this variance? In other words, can managers bring the item out of variance back into plan?

By researching variance, an operation has the best chance of developing the appropriate tactical or strategic plan: the business response.

### **3. Developing response plans**

Enterprise Analytics require two key planning capabilities. The first is the ability to simulate the operational performance of contact center environments quickly and accurately. The second is to automatically and optimally develop best response business plans given the appropriate business constraints. The mathematics associated with modeling these two functions have been available for decades, but it is only recently that computer speed has allowed these to operate fast enough for contact center business use. The two mathematical problems to solve, in more detail:

First, a quick and accurate model of the whole, interdependent operation is required. It is imperative that a contact center operation have the ability to accurately answer specific what-if questions, like: “If handle times increase over the next 7 months, what will my service levels be if I do not hire?”

In the past analysts muddled along using the Erlang equation which was notoriously inaccurate for answering strategic questions. Further, as contact centers become multi-skilled and multi-channel (e-mail, chat, etc.), the Erlang approximation can be even more misleading.

The modeling technology used by analytically leading organizations is discrete-event simulation. This technology allows for the accurate analysis of any contact center system, whether single-skilled, multi-center, multi-channel, or multi-skilled. It specifically answers questions like: “If I were to do X, what operational or financial performance could I expect?”

Second, a quick and optimal capacity planning model needs to be implemented. It is imperative that the Enterprise Analytic function have the ability to quickly develop best responses to business environment changes or specific what-if scenarios. Integer Programming is a mathematical modeling technology that directly addresses problems of this kind. It precisely answers questions like: “What is the fewest number of agents I can hire, and in which staff groups, in which centers, and at what time of year to meet an increase in call volumes over the next 18 months? Or should I use overtime to cover my peaks?” Integer programming technology finds the best business response to specific business scenarios.

It is only recently that these two technologies, discrete-event simulation and integer programming have worked well together and the power of these is easy to see. Leading contact centers can quickly and accurately perform what-if analysis (simulation) as well as quickly and optimally determine their best business response (integer programming).



#### **4. Enterprise performance-risk outcome matrix (EProm)**

The final step in the Strategic Analytic process may be the most important. Because mathematical technologies automate much of the strategic planning process, the time required to forecast, build what-if scenarios, and determine the best business response to every scenario is surprisingly short. More importantly, it is also of a significantly higher quality (i.e., more accurate and comprehensive) than manual or spreadsheet planning processes.

These technologies allow a different take on the planning process – they allow us to monitor and optimally plan for business uncertainty.

EProm is a methodology that enables intelligent decision-making in an uncertain environment. Simply, in the face of uncertain scenarios, each permutation of business response to possible operational scenarios can be planned out. This can be as simple an exercise as developing response plans for each of the possible scenarios. But this is the twist: analysts must also determine what will happen if their assumptions are wrong. They need to know what the operational risk is of missing a forecast and choosing the wrong course of action.

#### **The enterprise analytics: A software enabled business process**

Imagine this scenario: The forecasting/ variance monitoring team notices a significant increase in contact handle times over the last two months. The first step is to determine, using a quick and accurate simulation model, the result if the increase were to be ignored. If the increase is indeed insignificant or known to be temporary, the problem may be ignored; however, the center performance should be continuously monitored for further developments, if any.

If the change in handle times is significant or if it could be the start of a possible trend, there are several options to explore. It can be assumed that:

1. The forecasters made a mistake. Can it be fixed?
2. Something external has changed the Average Handle Time (AHT) of the contacts. Is this permanent?
3. Something internal has changed the AHT of the contacts. Is this permanent?
4. It is a random occurrence, a blip.

What are the possible courses of action? Using the Enterprise Analytic process enables the following actions:

- Forecast each scenario
- Determine the optimal decision (e.g. hiring plans or change in shrinkage targets) for each forecast possibility
- Determine the risk associated with guessing wrong: evaluate each optimal decision against the wrong forecast
- Evaluate a few middling (sub-optimal) compromise decisions
- Choose the best set of decisions based upon BUSINESS RISK

The EProm table would look like Table I.

Results are evaluated by producing full-on staff (hiring and overtime) plans and budget plans. Operational performance (service levels, ASA, abandons, sales and occupancy) is simulated and costs are known. Your final task: choose the plan that best supports your business risk profile!

SCENARIO FORECAST	DECISION/STRATEGY	SIMULATED RESULT	PROBABILITY
<b>AHT continues to grow over the next 12 months</b>	Staff to accommodate increased AHTs	Services is consistent, costs higher	<b>75%</b>
	Staff as though the increase is a blip	High overtime and attrition. Service catastrophe in three months	
	Staff somewhere in the middle	Variable service, high overtime, very high costs	
<b>AHT is a blip, and goes away in a couple of months</b>	Staff as though the increase is a blip	Service consistent, costs contained	<b>25%</b>
	Staff to accommodate increased AHTs	Much higher costs, until blip is recognized (through monitoring)	
	Staff somewhere in the middle	Somewhat higher costs, until blip is recognized (through monitoring)	

### Implementation of the enterprise analytic process: Strategic action

Enterprise Analytics is a software-enabled business process and it should be recognized as a new way of making contact center business decisions. The easiest part of this process to implement is the development of a regular monthly decision-making meeting. The best planning and analytic companies create a process that looks like Figure 1.

All of the technical/analytic functions associated with Enterprise Analytics are incorporated with the addition of this call-to-action, monthly, operational, decision making meeting. In this meeting, variance to plan is accompanied by an EProm analysis of possible decisions and their expected results.

Intelligent decisions follow from superior analytics and, maybe more importantly, an intelligent business process.

## Enterprise decision support for leaders and executives

Decision-making in contact centers has been almost by its very nature tactical and reactive. It's a cliché that in the contact center industry executive business questions cannot be answered in any timely fashion with any reasonable expectation of accuracy. It is the norm that executives must rely on their intuition and center experience without hard analysis.

But this does not have to be. Computer and mathematical technologies have improved to the point that decision support in complex operations, like multi-site, multi-skill, and multichannel contact centers, will become the norm through the application of the Enterprise Analytic process.

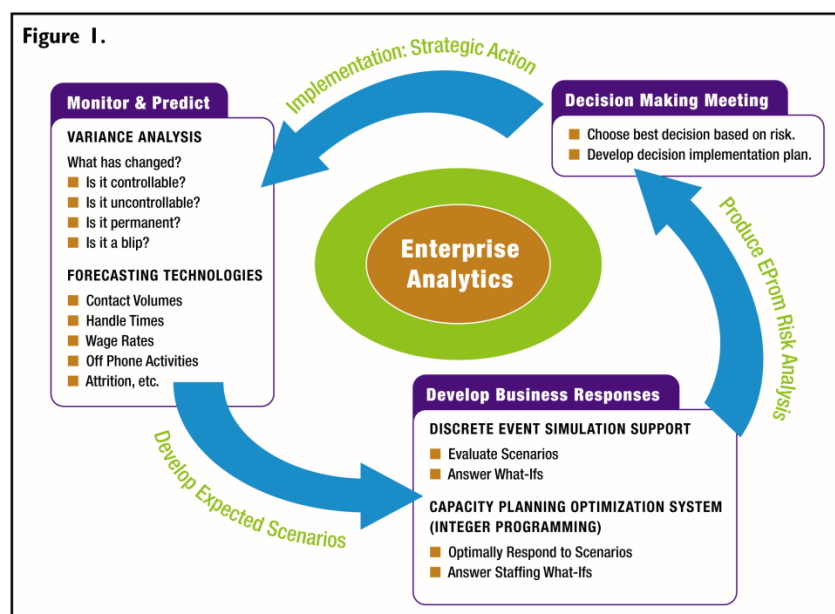
There are several major benefits associated with implementing an Enterprise Analytic process.

- A changing business or operational environment is understood early
- Potential business responses will be quickly and accurately analyzed for operational risk. The analysis is both comprehensive and strategic.
- Optimal business decisions are quickly implemented and easily defensible

By developing an Enterprise Analytics process, businesses can make strategic decisions almost casually, as a matter of course. No longer do “strategic initiative” processes require expensive consultants and several months of strategy meetings. Strategic decisions happen as part of the normal course of making business decisions. This is very powerful.

What do contact center executives want? They want answers to their business problems in a timely manner with a real expectation of accuracy.

Mathematical modeling technologies, through an Enterprise Analytics process, fulfill the promise of real decision support for contact centers.



## The author



**Ric Kosiba** is an expert in the field of call center management and modeling, call center strategy development, and the optimization of large-scale operational processes. Kosiba received a Ph. D in Operations Research and Engineering from Purdue University and an M.S.C.E. and B.S.C.E. from Purdue's

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Kosiba has obtained a patent on the application of optimal collection strategies to delinquent portfolios in addition to a patent on the application of simulation and analytics to contact center planning.

At the start of his career, Kosiba served notable roles for two major airlines including Manager of Customer Service Analytics for USAir's Operations Research Division as well as Operations Management Senior Analyst with Northwest Airlines. His specialties included airport and call center staffing as well as productivity improvement projects.

Following this role, Kosiba moved into Customer Support at First USA, where he served as Vice President of Operations Research. Expertise here included all facets of call center process improvement, ranging from overall collections strategy modeling to detailed staff plan development and call center budgeting.

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Kosiba frequently writes for numerous contact center publications and speaks at highly acclaimed technical and contact center forums.