

## Overview

Angoss is helping its clients achieve significant revenue growth and measurable return on investment, with systematic productivity improvement in their marketing, sales and risk management operations. We are doing this by helping our clients create predictive models through their data mining activities that create new insight and understanding about their customers, and by embedding this knowledge in their business rules governing marketing, sales and risk management activities to create more actionable, targeted predictive strategies that can drive higher levels of marketing effectiveness, sales performance, and superior risk mitigation.

- *Data mining* is the process of applying software analysis tools to your own business data to create predictive models. Through this process of pattern detection and relationship identification, organizations can better understand and continuously optimize the key drivers of their business performance. They can **discover** new patterns and trends in their data, apply this new knowledge in an automated way to accurately **predict** future performance, and **act** on this information by aligning company sales and marketing activities and resources to the achievement of these targeted objectives.
- *Business rules* reflect the decisions made while executing business processes and procedures organizations follow in their operating activities, such as executing marketing campaigns, allocating and prioritizing sales leads, and extending and monitoring customer credit. These business rules often involve the use of automation and computer systems – with specified decisions or actions being based on pre-defined decision paths or constraints (“if then” type rules).
- *Predictive strategies* result from the combination of predictive models and business rules to create more targeted, intelligent and automated marketing, sales and risk systems – which are driven by predicted outcomes, and which provide for actual results to be compared against these predicted results.

The impact of this combination of predictive models and business rules to form predictive strategies is a dynamic, responsive system for closed loop monitoring and optimization of marketing, sales and risk processes. It delivers significantly higher impact than non predictive business rules in such areas as customer acquisition, customer value maximization, customer retention, marketing spend optimization, and credit loss mitigation. Examples include the ability to target and reach new market segments with significant revenue potential, the ability to deliver sales teams targeted lead leads, prioritized for highest best closing opportunities, and the automated approval (or rejection) of a credit card or health claims transaction, an application for credit, the triggering of a marketing promotion or sale offer, or the creation of an automated alert flagging an unusual activity or transaction. Some of the same techniques used to develop predictive strategies can also be used to analyze strategies after they have been used.

## Marketing Lifecycle Applications

- Post Campaign Analysis
- Customer action for Churn
- Assign customer action items based on Score Bands
- Customer Acquisition
- Next and/or best offer recommendation

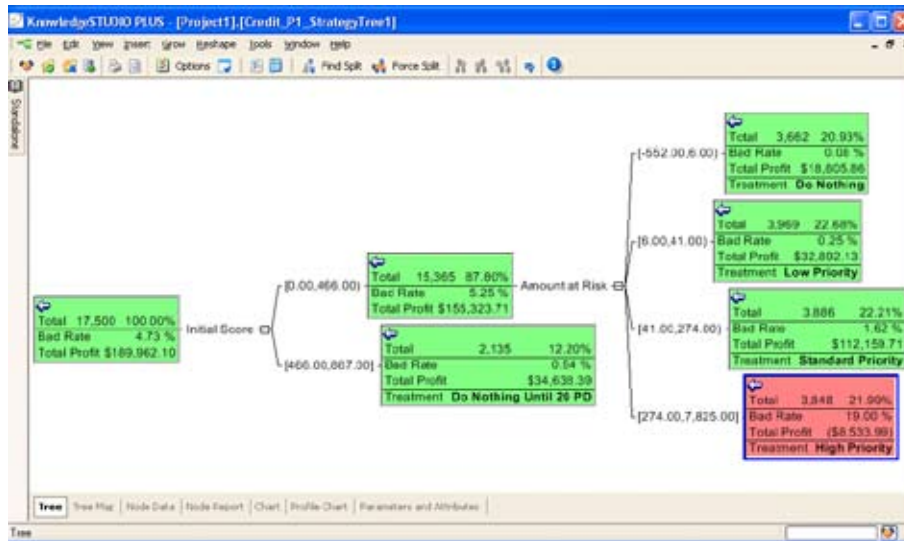
## Risk Management Applications through the Credit Lifecycle

- Acquisitions/Origination
  - Approving/declining incoming applications
  - Limit setting
  - Price setting
- Account Management
  - Line Management (Credit limit increase/decrease)
  - Cross sell offers
  - Transaction Approval (e.g. early delinquency and over limit approvals)
  - Card Reissue
- Collections
  - Resource allocation (best treatment to the right customer)
  - Recovery
- Fraud

This white paper assumes the reader is familiar with the data mining process and the resulting predictive models created from your marketing, sales and risk data using KnowledgeSTUDIO®, the Angoss data mining and predictive analytics system.<sup>1</sup>

StrategyBUILDER™, a new software module from Angoss, is the latest addition to the Angoss portfolio of predictive analytics tools. It provides users with the ability to design and deploy predictive strategies, integrating predictive models created in KnowledgeSTUDIO with the current business rules governing an organization's marketing, sales or risk business processes, resulting in a highly automated and optimized decisioning environment that yields significant user and organizational benefits.

<sup>1</sup> See the Angoss KnowledgeSTUDIO and Angoss KnowledgeSERVER® White Papers.



**Figure 1:** StrategyBUILDER helps in defining and implementing customer specific rules or strategies. In this example, the objective is to develop a collection/customer contact strategy for a retail chain. The root node is split on credit score. Very low risk customers are not contacted until 30 days past due. The remaining people are prioritized based on the amount at risk. Higher balances are given a higher priority.

## Predictive Strategies Are Driving Performance Improvement at Global Market Leaders

Global financial services organizations are the market leaders in the adoption and use of data mining and predictive analytics systems to mine and leverage their customer data. StrategyBUILDER has been designed as a result of our decade long relationship with some of the world's most advanced users of predictive analytics technologies. Consistent with our approach, we have taken these requirements, and implemented them in a software environment that is powerful, affordable, and easy to learn and use.

### How and why have these requirements been created?

Data mining has been used with success by many large organizations for many years. Similarly improvements in business rules and processes resulting from data mining have become part of their day to day business operations.

- In the credit area, this has been demonstrated for example through the use of the ubiquitous credit scores, as an input into credit card and loan origination systems – whether developed in house or purchased. Many lending decisions are based primarily on the integration of applicants' credit scores into a business rules system that provides for “approval” or “denial” of credit on the basis of the score value and also may set limits and more recently rates.

- In the marketing area, this has been demonstrated through the use of predictive models to score customer populations and create segments based on a set of rules to construct target lists for use in direct mailing, telemarketing, email, and other campaign and offer related activities.

For a variety of competitive, regulatory, and customer level reasons, in recent years banks have become increasingly focused on combining and managing a growing number of proprietary predictive models, and integrating these models with a more sophisticated set of business rules to achieve superior levels of customer service and business performance.

Examples of desired capabilities include not only “faster time to decisions” (through the use of an accelerated strategy development cycle and closer-to-real time alerting capabilities) but “business performance management” needs around continuous process improvement, continuous measurement, monitoring and improvement of performance in call centers, customer marketing areas, and sales force operations against defined business metrics and key performance indicators.

What is new is how enabling technologies are emerging to provide more intelligent, targeted, and effective customer level business strategies to be deployed with less time, operational risk, personnel resource, and cost - allowing such decisions to play a more prominent role in the day to day contact with customers.

The result? By combining predictive analytics capabilities with operational environments, financial services companies are bridging the “information gap” between traditional, reactive business intelligence systems and the ‘here and now’ nature of their customer relationships.

Optimized decisions geared to the specific needs of individual customers where these needs are aligned with the organization’s individual level goals using systems designed to enable the financial organization to achieve high levels of customer satisfaction and value.

### **Using Predictive Strategies to Drive Business Value**

Predictive models, created with data mining systems, learn from past data to predict future behavior. When these models are used, systems can behave in an intelligent fashion.

Some simple examples are:

- A marketer will decide to only contact people for a marketing campaign who are within a specified region (business rule) and who have been predicted to be likely to respond to an offer, with a likelihood of 70% or more (a predictive rule)

- A sales manager will create a sales territory coverage plan that requires all inside sales team members to make at least 50 calls a week (a business rule) and select the targeted recipients of calls from a list of the customers most likely to buy (a predictive rule)
- A risk manager, will only increase credit limits to people who request credit limit increases if they are not overdue in past payments (a business rule) and are not likely to default on their payments in the next 180 days (a predictive rule)

The origins of predictive strategies are primarily from banking credit risk management, with use driven by the need to automate analytically driven decisions at each stage of the credit lifecycle process. If you are a bank, with a portfolio of tens of millions of cardholders transacting and making (or not making) monthly card payments, and with new applicants being issued cards each month, the scope, scale and speed of automated decisioning requirements become clear.

Today, almost all consumer and small business lending decisions are at least partially if not fully automated, driven by the following forces:

- The need to expand business revenue and earnings growth opportunities (new geographic markets and new customer risk profiles).
- The need for cost efficient decision making and decision execution
- The need to create, follow and consistently execute organizational strategies, tactics and operating objectives within a sound framework of risk policies and procedures meeting executive, board and regulatory requirements.
- The need for to ensure an acceptable level of customer service, and provide timely customer decisions and offers in a competitive business environment.
- The need to be able to objectively assess and measure performance and impact of specific, differing strategies against key performance indicators.

Ultimately, any initiative in the lending domain must be trying to achieve more revenue (from interest or fees) with less write offs, delivered with less cost.

Usage of predictive models as an integral part of automated decisions are less well developed in the marketing and sales areas, with the notable exception of the direct marketing and database marketing efforts of very large organizations. The business case for the use of predictive strategies in marketing and sales is quite simple – significantly reducing marketing costs by achieving higher response levels; or significantly improving sales productivity in terms of revenue to quota achievements across a sales team.

However, the application of this capability has either been done solely by a small group of sophisticated users (the typical “SAS modeler”) or it has become subordinated and buried within complex and costly IT projects, such as data warehousing systems, and “customer relationship management” systems, or often times both. As a result, while such efforts have nominally had as their goals enabling more strategic use of business information about customers, they have generally failed to live up to their promise and cost.

More recently, customer needs have also grown towards enabling optimization of customer value and profitability on the premise that individual customers (or micro-segments) are sufficiently differentiated to warrant distinct treatments. Some customers are profitable others are not. Some are profitable and have a high risk of leaving or defaulting. A select few are profitable and low risk.

Predictive strategies have become, in a CRM context for marketers and sales managers, the means to define “the rules of engagement” with and for individual customers. Nowadays, these rules of engagement are also being fed in market leading organizations by growing groups of predictive models.

### Making Predictive Strategies Actionable

While the adoption and use of predictive models has become more common place, one of the primary challenges in their use involves assessing the impact of adopting different strategies, or making different treatments available, based on combinations of these predictive models – with or without a superset of business rules.

For example, a particular campaign or offer may be targeted at English speaking adult female and use more than one predictive model. Perhaps one model predicts churn and a second model predicts value.

The following chart illustrates how an organization might decide to treat a qualified group (for example, adult English speaking females) based on their estimated propensity to churn and customer lifetime value scores.

**Figure 2 – A Decision Table Based On Multiple Predictive Models and Strategies**

<i>Working document to determine possible retention treatments and profiling elements required.</i>									
<b>Churn Risk Score Ranges</b>	<b>Retention Value Segment</b>								
	<b>Extremely High Value</b>	<b>High Value 1</b>	<b>High Value 2</b>	<b>Average Value 1</b>	<b>Average Value 2</b>	<b>Low Value 1</b>	<b>Low Value 2</b>	<b>Low Value 3</b>	
<b>Extremely High Risk</b>	Process 1	Process 1	Process 1	Process 2	Process 2	Auto Flag to Sales	Auto Flag to Sales	Auto Flag to Sales	
<b>High Risk</b>	Process 1	Process 2	Process 2	Process 2	Process 2	Auto Flag to Sales	Auto Flag to Sales	Auto Flag to Sales	
<b>Average Risk</b>	Process 1	Auto Flag to Sales	Auto Flag to Sales	Auto Flag to Sales	Auto Flag to Sales	NONE	NONE	NONE	
<b>Low Risk</b>	Monitor	Monitor	Monitor	Monitor	Monitor	NONE	NONE	NONE	
<b>Extremely Low Risk</b>	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	
<b>Treatment:</b>									
Process 1:	Sales Reps must contact customer within 2 weeks.								
Process 2:	Sales Rep must contact customer within 3 weeks.								
Auto Flag to Sales:	Sales reps notified and should action accordingly.								
Monitor :	No communication to Sales Reps.								
NONE:	No action necessary.								

Transformation of predictive models and associated business rules into predictive strategies remains a complex, cumbersome, error prone process, often performed manually.

Once scripted, a list of strategies or treatments can be implemented and made available systematically to an operational application or database (to support an alert to a sales rep, creation of a segmented mailing list by a marketer etc). For example, a risk department may pre-approve customers for certain credit offers or line limit extensions and write these results to the data mart. Marketing users can then pick up this information as they formulate cross sell offers. One Angoss client, for example, has numerous pre-defined offers and approvals for every adult American potential borrower.

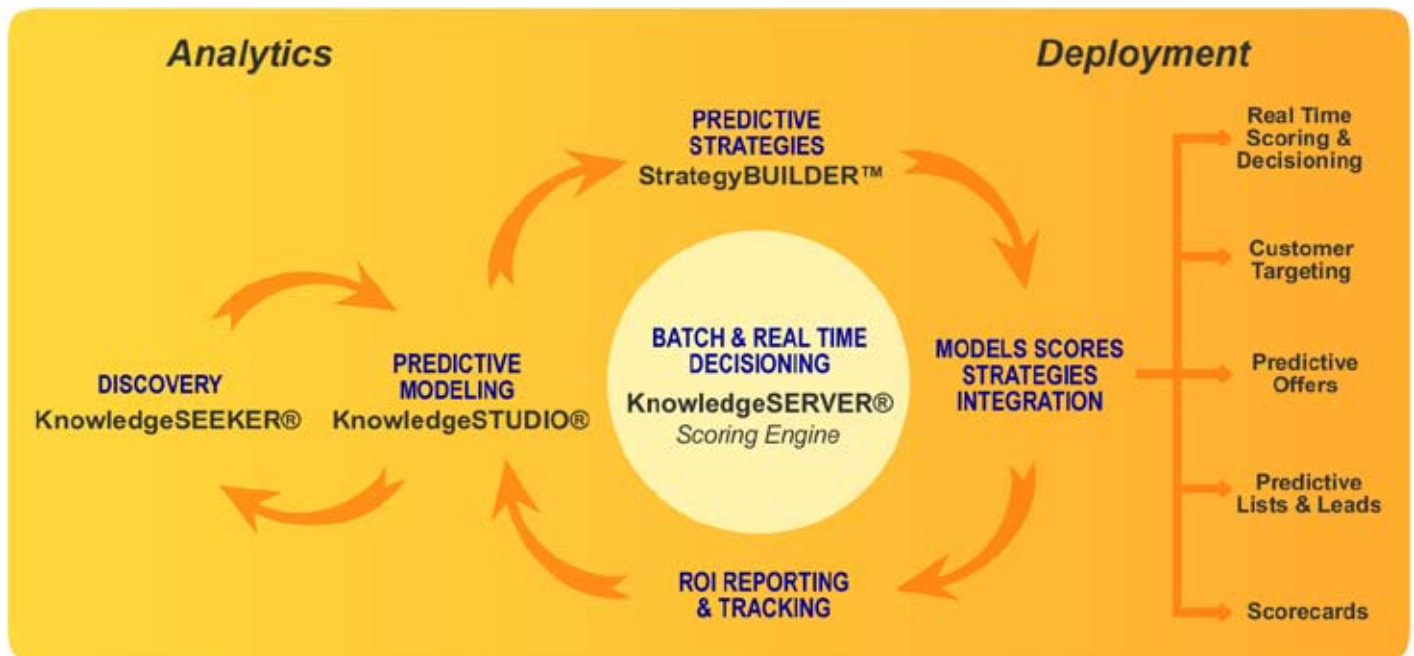
While these types of deployment can be simple and effective ways to automate and deploy predictive strategies, they do have disadvantages. Batch runs may take a long time to run in very large data environments and the results are not always up-to-date. For example, if you update the treatments once a month (say after your data mart is updated) and the whole process of updating is finished 1 week after the month end, then the treatments will be anywhere from 1 week to 5 weeks old (an average of 2.5 weeks). If the treatments are based on the user's current balances, then as a user balance changes, the treatments become suboptimal.

Similarly, since the authors of predictive models and of predictive strategies and the personnel responsible for their testing and deployment are often in different parts of the organizations, running different systems, such as the implementation of strategies in a Fair Isaac TRIAD credit system for example – additional cost, time and effort is involved. Challenges related to these approaches include incompatibility between strategy design environment and systems and the deployment environment and systems, inadequate change management or synchronization of systems, and other considerations.

Code generation must be viewed as a part of the entire strategy development process. Naturally, the data values and variable names in the execution environment must perfectly match the variable names and data values in the generated code. The variables and values in generated code are based on the variable names and data values found in the training dataset. It then follows that the dataset used to generate the predictive models and strategies must perfectly match the execution environment thus making the data preparation a crucial step in overall process.

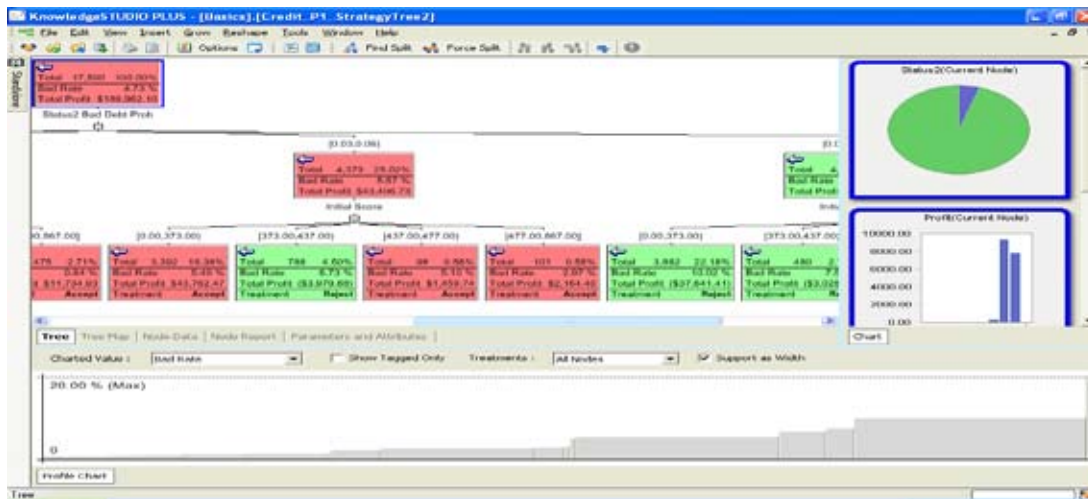
## Angoss StrategyBUILDER: For Predictive Strategy Design and Deployment

The Angoss predictive analytics system contains a fully integrated suite of knowledge discovery, predictive modeling, scoring and predictive strategy design and deployment capabilities.



These capabilities ensure that:

- The predictive strategy design and deployment environments are perfectly aligned
- Strategy designs can be developed iteratively and interactively based on a range of what if scenarios and forecasts created on a train of thought basis by the strategy author.
- When finalized, all input elements required to feed the predictive strategies are embedded in the deployment environment, so organizations have extensive flexibility to configure and evaluate a range of strategies and treatments
- Manual processes are virtually eliminated as the strategies (in the form of XML) generated in the development environment can be dropped directly into the production environment
- Nothing is lost in the translation process because the model is moved verbatim from development to production.
- Strategies can be deployed in both batch and real-time to support dynamic decision making
- Strategies can be continuously monitored, modified and optimized, from the same environment



**Figure 3** – shows the StrategyBUILDER strategy design environment. Nodes are logically color coded (in this example, profitable nodes are green and non profitable nodes are red). The profile chart shows the selected KPI (in this case bade rate) for all of the segments and how finely the population has been segmented. The tree chart shows the distributions of any KPI for any segment that you click on.

### Feature Benefit Chart

Feature	Benefits
Tree Calculations	Tree calculations show any KPI that affects your decision in how to treat your customers. The KPIs are immediately updated as you change the segmentation, so you can leverage speed of thought capabilities to craft better performing strategies.
Assigning Treatments to nodes	While viewing the segmentation, you can interactively assign the action (or sequence of actions) that you want to perform on the identified segment.
Treatment Report	You can closely monitor the scope and impact of your treatments so your action plan conforms to the available resources and goals.
Validate Strategy	Strategy Validation allows you to compare any two datasets in context of the KPIs and segments defined by the Strategy Tree. This allows you to show the statistical validity of your strategy, if your strategy has been implemented as planned, compare how the indicators are changing over time, and understand which segments are pulling up performance and which segments are not.
Node report	The node report allows you to view your segmentation as a spreadsheet and sort the segments by any KPI that you have defined. This makes it easy to manage complex strategies with many segments or KPIs.
Select any DV anywhere in the tree	You can leverage the AI embedded in the Angoss decision tree component to assist in your segmentation to optimize the splits to maximize your varying goals for each segment.

## Case Example

### Marketing Campaign

#### *Business Problem*

Marketers constantly struggle with defining accurate and profitable marketing strategies. Profitable campaigns are developed with the input of a variety of factors including segmentation/prediction of target audience, product available for offer, methods and associated costs of delivery.

If a marketer has \$100K to spend on a new campaign they need to determine the right target to maximize response and profit.

#### *Solution*

The workflow for a marketer in solving this problem consists of a variety of easily executed steps:

- Access data and mining views in a data repository or file that contains a combination of customer attributes, predictive scores, and customer segment information. The predictive scores and derived attributes may be computed from KnowledgeSTUDIO.
- Data is examined and profiled. This data is then segmented into partitions for testing and strategy development.
- A Strategy Tree is created, in StrategyBUILDER, as the marketer iteratively develops strategies by growing the tree and splitting on characteristics such as predictive scores, age, geography etc.
- Calculations can be done at each node to determine performance characteristics such as profitability of the group of customers in the node, or average purchase amounts.
- At each node, treatments or actions can be applied according to the aforementioned calculations. Examples could be to telemarketer the target group, or just send a mailer.
- StrategyBUILDER provides a treatment summary report and node report to produce summaries of treatments and performance metrics for each node within the Strategy Tree.
- The Strategy Tree is applied to the hold out sample and the various calculations are compared. Since the calculations are similar between the design and the holdout, the strategy is kept as is.
- The marketer determines which strategy calculations and treatments are optimal and lists are generated to run the campaign.
- At a later date, validation can occur to determine whether the treatments are resulting in the desired performance metrics.

#### *Outcome*

- With the StrategyBUILDER module, a marketer defines segments in their dataset utilizing user-friendly trees, and determines various performance metrics and strategies for subsets of the target market.
- Target lists are easily generated and validation of strategies can be simply performed.

## Case Example

### Credit Line Increase Determination

#### *Business Problem*

The credit department of a major loan organization is mandated with increasing balances and therefore increasing revenue while at the same time has an acceptable number of write-offs. How do they determine to whom to extend credit line increases in order to meet business objectives?

#### *Solution*

The workflow for a credit analyst in solving this problem consists of a variety of easily executed steps:

- Access data and mining views in a data repository or file that may contain a combination of account information such as status of account, balance, risk scores etc. Import this data into KnowledgeSTUDIO.
- Data is examined and calculated columns are created for additional data elements. This data is then segmented into partitions for testing and strategy development.
- A Strategy Tree is created as the analyst iteratively develops segments by growing the tree and splitting on decision key metrics such as tenure, risk scores, age, balance etc
- Calculations can be done and computed at each node to determine performance characteristics such as profitability of the group of customers in the node or average write off amounts.
- At each node, treatments or actions can be applied according to the aforementioned calculations and the related business rules within the organization. Examples could be “same limit”, increase by \$1000, or decrease by \$2000.
- StrategyBUILDER provides a treatment summary report and node report to produce summaries of treatments and performance metrics for each node within the Strategy Tree.
- The analyst validates the strategy by comparing the calculations to the hold out sample. Various profitability estimations are also computed. The strategy is then re-keyed to deploy the campaign into systems such as TRIAD™.
- At a later date, further validation can occur to determine whether the treatments are resulting in the desired performance metrics, such as average profit, for the target market in each node.

#### *Outcome*

- StrategyBUILDER gives a credit organization defined segments, utilizing user-friendly trees, and determines various performance metrics and strategies for subsets of the target market.
- Credit line increases are properly implemented; balances are increasing and interest payments are up. Bad rates are in-line with expectations.

## Conclusion

The market leaders in the deployment and use of predictive analytics systems are breaking new ground by embedding a broadening array of predictive models within a broadening set of specifically defined business rules intended to drive maximum value and deliver highest possible levels of service to their customer base.

Angoss has been working with many of these clients for almost a decade and consistent with its commitments to industry leadership, thought leadership, innovation, and the delivery of advanced analytics systems that are easy for business users to learn, deploy and use, have brought StrategyBUILDER to market.

StrategyBUILDER is an illustration of the next generation of predictive analytics systems that bring real time decisioning and optimization – across marketing, sales and risk management areas – to an ever broadening set of business rules and business processes.

Angoss predictive analytics software empowers sales, marketing and risk management professionals to make "Better Business Decisions. Every Day."™ Many of the world's leading financial services and communications companies use Angoss solutions to accelerate revenue growth, while reducing risk and cost. Angoss solutions empower users to **discover**, **predict**, and **act** faster to achieve higher levels of business performance.

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