

## **How Word-of-Mouth Impacts Medicare Product Launch and Product Design**

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### **1 Abstract**

We have developed a software simulation platform for marketing strategy and planning. The platform enables marketers to understand how word-of-mouth (WOM), social networks and other types of consumer interactions all influence the outcome of any marketing initiative across traditional and non-traditional channels.

In 2005 we began working with Humana's Senior Products group to help them plan their marketing strategy for new product launches that were planned for 2006, when Medicare plans were mandated by law to begin including prescription drug coverage. Our tool helped Humana make a number of important predictions and it elucidated key aspects of how WOM would impact the outcome of their marketing initiatives.

One year after the launch of the new Medicare plans, Humana had moved from sixth largest to second largest provider of Medicare plans in the United States.

An additional benefit of our simulation technology is that it can also be used to understand many aspects of what motivates consumer behavior – not simply the response to advertising and WOMUnits. Realizing this, we have been working with Humana to create a version of the same software platform that is being used by product managers to help them design better offerings.

In this paper we explain why WOM should be treated as an integral part of marketing strategy, we outline our approach, we describe the specific problem we had to solve, we describe our implementation of the software simulation platform, and we report our findings and results from the launch of new Medicare plans.

### **2 Introduction**

Word-of-Mouth is a topic that has generated significant recent interest in the areas of marketing, advertising and communications. In a way, WOM has always existed. The recent resurgence of interest in this form of consumer-to-consumer communication arises from the dramatic change in how consumers exchange information with one another ("WOMUnits"), and in the way consumers can access and share information about products and services. (From now on we use the term "offering" to refer to either a product or a service.) These changes, which have been brought about by the proliferation of online and wireless communications, are having a profound impact on marketing and advertising.

For one thing, the brand is no longer entirely controlled by marketers: consumers are usurping some of that control, often shaping the perception of a brand through WOM, consumer-generated media, online opinion sites, and other actions.

Furthermore, because information can spread globally and virtually with no delay, marketers need to ensure that their message to consumers reflects accurately the characteristics of their offering. Any major discrepancy between advertising and market reality will cause a fast, significant backlash that can have devastating effects.

Marketers have only recently begun to realize the importance of WOM as a mechanism that influences consumer perception and behavior. The growth and success of the Word of Mouth Marketing Association (WOMMA) are indicative of the rapid increase in awareness about WOM. However, as is often the case with novel approaches or technologies, the commercialization of WOM is still in its infancy, it is focused mostly on tactical activities, and it has not yet been widely adopted.

Through our extensive research and commercial experience, we have learned several important lessons about WOM. First, we believe that there are many actions and venues through which consumers can share WOMUnits: they may talk with friends and family, they may read or post online reviews, they may see someone else use the offering. Most importantly, consumers *experience* the product or service, and as a result of their experience they formulate an opinion about it and may share this opinion with other consumers.

We also agree with the generally held view that there are many types of WOM, not all positive and not all effective. Negative WOM often arises, as mentioned above, when consumers have a negative experience with an offering, especially when that negative experience is misaligned with their expectation: a consumer having a mediocre meal at a fast-food restaurant is much less likely to complain about it (and thus generate negative WOM) than a consumer eating at an expensive French Restaurant that received raving reviews. As to positive WOM, there is a difference between consumers talking about an offering, and consumers *advocating* use of that same offering. Just because people are talking about a product, it does not mean that overall consumer sentiment is rising. There are many examples of commercials that generated a lot of “buzz” – but the buzz quickly faded and there was no visible long-term impact or benefit.

But the converse is also true, and in our opinion this is one of the least understood and appreciated aspects of WOM. Namely, *WOM happens all the time and it influences every marketing or advertising initiative*. Because of the increased ease of sharing information, it is rarely the case today that someone purchases a product or service without having been influenced by other people. Even for low-involvement products, consumers may be consuming and relaying WOMUnits about pricing, promotions, and other factors that influence purchasing decisions.

Finally, we believe that there is a general tendency to underestimate or ignore the fact that there are many different types of social networks, and that the structure and nature of these networks has a profound influence on the distribution spread, velocity and timeliness of WOMUnits. Treating consumers as a homogenous network, and WOM messages as if they were a virus spreading through a population, misses some extremely important aspects of the richness and variety of ways in which WOMUnits are shared among consumers.

In all, we believe that marketers need to be mindful that any initiative they undertake will be shaped by a number of factors that depend heavily on the nature and timing of

interactions among consumers, as well as characteristics of the consumers. The analogy of an advertising campaign as a stone creating a ripple in a pond is a gross oversimplification. A more apt analogy might be that an advertising campaign is akin to throwing an object in a body of water and seeing how it impacts the aquatic life. What kind of object is it? A rock, a stick or a piece of paper? What kind of body of water? Is it a stagnant pond, a rapid stream or a vast ocean? And what sort of aquatic life? A bed of clams, a school of fish or a cloud of plankton?

Today, marketers are happy to throw small advertising stones into the consumer pond to see what happens. But before spending significant effort implementing WOM activities, marketers should try to understand the factors that are relevant to their particular circumstances, and they need tools that can help them to clarify and quantify the mechanisms at work.

At Icosystem, we have championed the use of a technology known as *agent-based modeling* (ABM) as a way of simulating, predicting and optimizing consumer behavior. For the last three years we have applied this technique specifically to understand how WOM impacts marketing, helping several companies and agencies to improve their return on marketing investment. In this paper we focus on a case study of a project done for Humana, Inc., to help them understand how marketing initiatives are influenced by a rich network of interactions that include competitive messaging, government information, as well as direct exchange of information among consumers and between consumers and other members of the healthcare “ecosystem,” such as physicians, nurses, pharmacists, service professionals and sales reps.

In the section that follows we describe the specific problem and our approach to a successful solution.

### **3 Case Study: Launching new Medicare products**

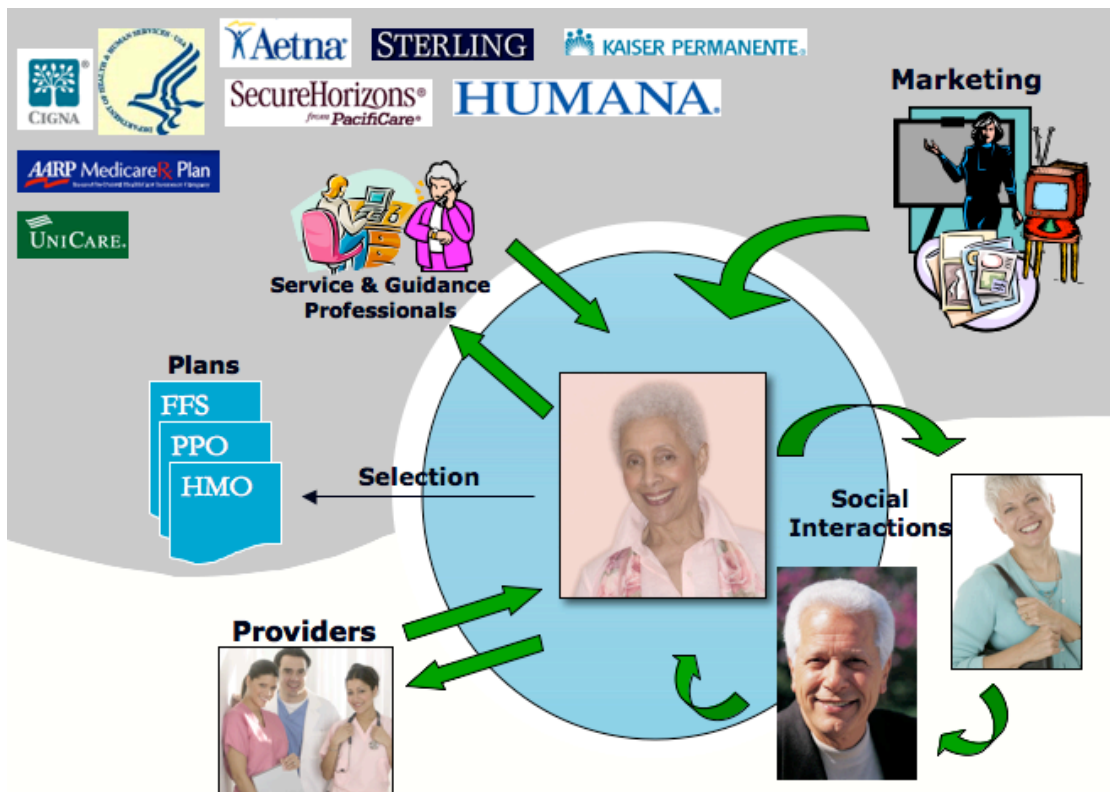
On January 1, 2006, the government enacted the *Medicare Modernization Act*, which provides seniors and disabled individuals with a prescription drug benefit, more choices, and better benefits under Medicare. Health insurance companies had an opportunity to compete to offer new Medicare plans that including prescription drug coverage.

This represented an opportunity but also a significant disruption for the industry for several reasons. First, Medicare plans previously had not included prescription drug coverage. Hence the providers had to design entirely new products. Second, there was no historical data to understand how seniors would react to the new plans. This meant that traditional regression-based models, which rely on historical data, could not be used to estimate enrollment or to guide marketing investments. Third, the complexity of health insurance, coupled with the vast amounts of information disseminated by the government, by special interest groups (such as AARP) and by competing health insurers meant that seniors were going to be bombarded with information – with no clear understanding of whether they would be able to process it, or whether they would simply become overwhelmed and either not chose a new plan, or choose one randomly.

In 2005 we began a project with Humana to apply our ABM techniques to help them understand how best to design marketing campaigns for the new Medicare plans. The ABM technique is ideally suited to the problem because it can capture the complexities

outlined above, and is superior to regression-based models, especially for new product launches for which no historical data exist. Furthermore, we believed that WOM would play a central role in this problem: seniors tend to have more time for socializing, and health becomes increasingly central as a topic of discussion. Hence we suspected that any marketing initiative would have to take into account WOM interactions.

The Medicare “ecosystem” is a perfect illustration of our earlier points that there are many different types of social networks, and that there are many different ways in which consumers exchange WOMUnits about an offering. Seniors are likely to talk to their friends and peers about health insurance, representing a traditional form of WOM. Seniors are also likely to exchange WOMUnits with family members who may not be users of Medicare plans themselves, but who may have influence on financial or care-taking matters that are impacted by the senior’s choice of Medicare plans. Hence the interactions with family members can be assumed to differ in nature and frequency with the interactions among seniors. Of course seniors also interact with many other individuals: physicians are likely to have a profound impact on seniors’ opinions, and they are likely to interact with seniors most frequently when the seniors’ health is at risk – and thus when Medicare plans are extremely relevant. Pharmacists, nurses, and other health care professionals likewise interact with seniors in ways that are very different from the interactions among seniors. Finally, seniors are exposed to information from sales reps, informational meetings, the government, and marketing material from various competing health insurance companies. In all, we see a high degree of source diversity, with many types of participants exchanging many types of WOMUnits. Figure 1 is a high-level diagram representing the key elements of the “Medicare ecosystem”.



**Figure 1:** Key elements of the Medicare ecosystem.

The situation is rendered even more complex by consideration of demographic and geographical factors. A county in Florida is likely to have a higher proportion of seniors than, say, a county in Minnesota. Also, the nature and amount of WOM actions are likely to differ dramatically between urban and rural areas. In an urban environment, a senior is likely to come into contact with a variety of physicians, each with a different opinion and a different degree of influence over the senior; that same senior is also likely to interact with a variety of other individuals on a regular basis through a rich social fabric. In contrast, a senior in a rural area may rely mostly on a single family physician for most decisions, and interactions with other individuals may be less frequent.

All of these and other factors must be taken into account to estimate the likely impact of a given marketing initiative – whether a TV advertisement, a sponsored community meeting, or an informational booth inside a department store.

### 3.1 Our approach: agent-based modeling

We helped Humana with their Medicare marketing by creating an agent-based model<sup>1</sup> (ABM) that captures many of the complexities of the Medicare space that we just described, represented in Fig.1.

In a nutshell, an ABM captures in software all the relevant elements of a system or process from the bottom-up. Each agent represents an entity in the system being simulated, including its main characteristics, its behaviors, and its responses to external factors. In most cases, an ABM includes multiple types of agents, representing all the relevant entities. Agents can include people (seniors, family members, friends, professionals ...), companies (competitors, partners, vendors...), and other types of entities whose behavior can change during the course of a simulation (e.g., the media, regulatory bodies, financial institutions). For this project, agents were used to represent seniors, Humana sales reps, competing health insurance companies, Government sources, and a variety of individuals within the healthcare system (e.g., physicians, pharmacists, guidance professionals). Note that while some agents represent individual people, other agents can represent an entire company (e.g., a competitor).

The ABM simulates how all these elements and factors vary over time. An internal “clock” cycles through the simulation. At each time step, various events can take place. For instance, during each simulated day, a “senior” agent has a certain probability of selecting a health plan, using a health plan benefit, or talking about it with a friend; a “competitor” agent may decide to launch a campaign to promote a particular aspect of one of its plans; a “physician” agent may interact with one or more seniors and make recommendations about a particular Medicare plan. As the simulation unfolds, all the agents behave and interact. At the conclusion of the simulation period the ABM can show the final results, while keeping track of everything that happened during the simulation for deeper analysis.

ABMs include a certain degree of *stochasticity*, or randomness. For instance, given the choice between two Medicare plans, the probability that the agent chooses one over the

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<sup>1</sup> As will become clear from the subsequent description, we refer here to software agents, not the types of human agents that are engaged in WOM campaigns by companies such as BzzAgent, HigherOne, etc.

other depends on the agent's relative preference, but there is always a chance that the agent will choose the less preferred plan. Hence even when all initial conditions and external factors are identical, it is possible to get different outcomes. For this reason, usually each simulation is run multiple times to gain an understanding of the robustness of any given outcome.

More importantly, the ABM makes it possible to see how the behavior of the system changes under different scenarios. A scenario may be defined in terms of the initial conditions (e.g., simulate an urban rather than rural environment), the agent characteristics (e.g., make the seniors' choice of plans less dependent on the opinion of their friends), or aspects of the marketing strategy (e.g., allocate more money to TV advertising). By running multiple simulations under each scenario, it is possible to understand how each factor influences the outcome, and how sensitive the overall system behavior might be to each of these factors.

### 3.2 How the "Senior" Agents Work

Creating an ABM requires design and implementation of several key components: (1) what are the key characteristics of each offering that an agent cares about, and how much do they care about each characteristic – we refer to these as *relevances*; (2) how each agent believes that each existing brand matches up with each of the relevant characteristics, in other words their *perception* of each available brand; (3) a decision-making mechanism that each agent uses to choose from alternative offerings; (4) a set of relevant behaviors that the agent can exhibit; (5) how the agent's perceptions change over time as a result of influencing factors, which can include WOM, advertising, and direct experience with the offering. The last point is particularly important: through our simulations we found that the quality of service experienced by seniors who actually used the plan benefits had a strong impact on their plan selection, and could also have an indirect influence on other seniors through WOM events.

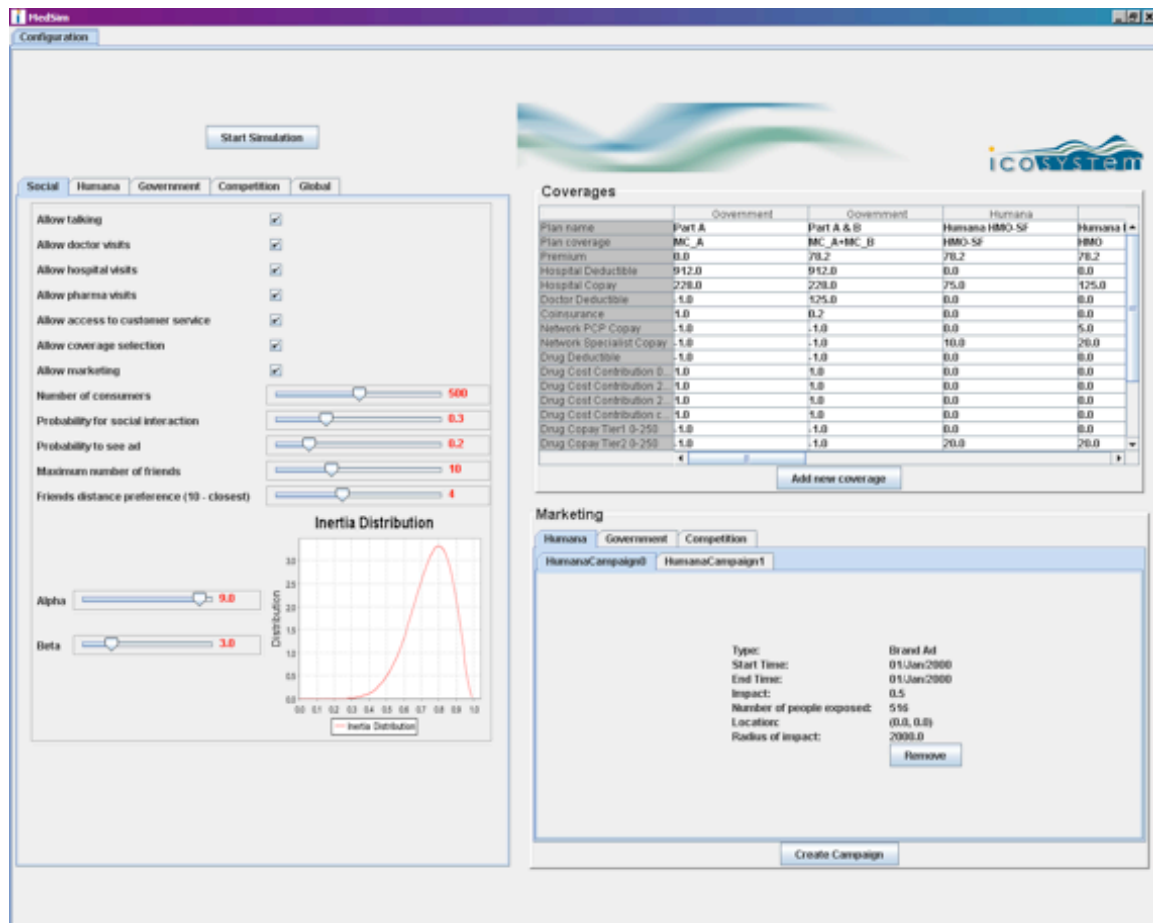
### 3.3 The Software Platform

Creating the ABM for Humana was a highly collaborative process, which combined domain expertise, data processing, and modeling expertise. The result was a software platform that Humana marketing personnel used to test the likely impact of any campaign in any given market. Figure 2 is a screen shot of the platform we developed for Humana.

The panel on the left of the screen allows the user to select values for various parameter sets. The figure illustrates some of the parameters used for the social network / WOM, including the average number of friends for senior agents, the probability for social interactions, and a number of other factors that jointly determine the likelihood of WOM events at any given time during the simulation. Note that most of these parameters reflect average values, but the exact value of any given agent is drawn from a probability distribution, so that each agent tends to have a particular set of characteristics that differ from those of other agents.

Typically these distributions are based on data already available to our client, or they can be gathered through primary or secondary research. In other cases there may not be enough information to "hard-wire" a probability distribution. If this is the situation, the user can be given the option of trying different distributions to see whether and how the

shape of the distribution impacts the results. The curve labeled “Inertia Distribution” is an example of this situation. It is often the case that people choose the health insurance company they already had due to “inertia,” rather than based on a sound decision. This could be because they do not care or because they are overwhelmed by the complexity of the choices before them. Since we did not have data on the distribution of inertia levels, we assumed that the inertia value of a population of seniors follows roughly a beta distribution<sup>2</sup>. As seen in the lower left of Fig.2, the user can choose the parameters of the beta distribution, and test the impact of changing assumptions about inertia.



**Figure 2:** Screen shot of the main user interface for the Humana ABM platform

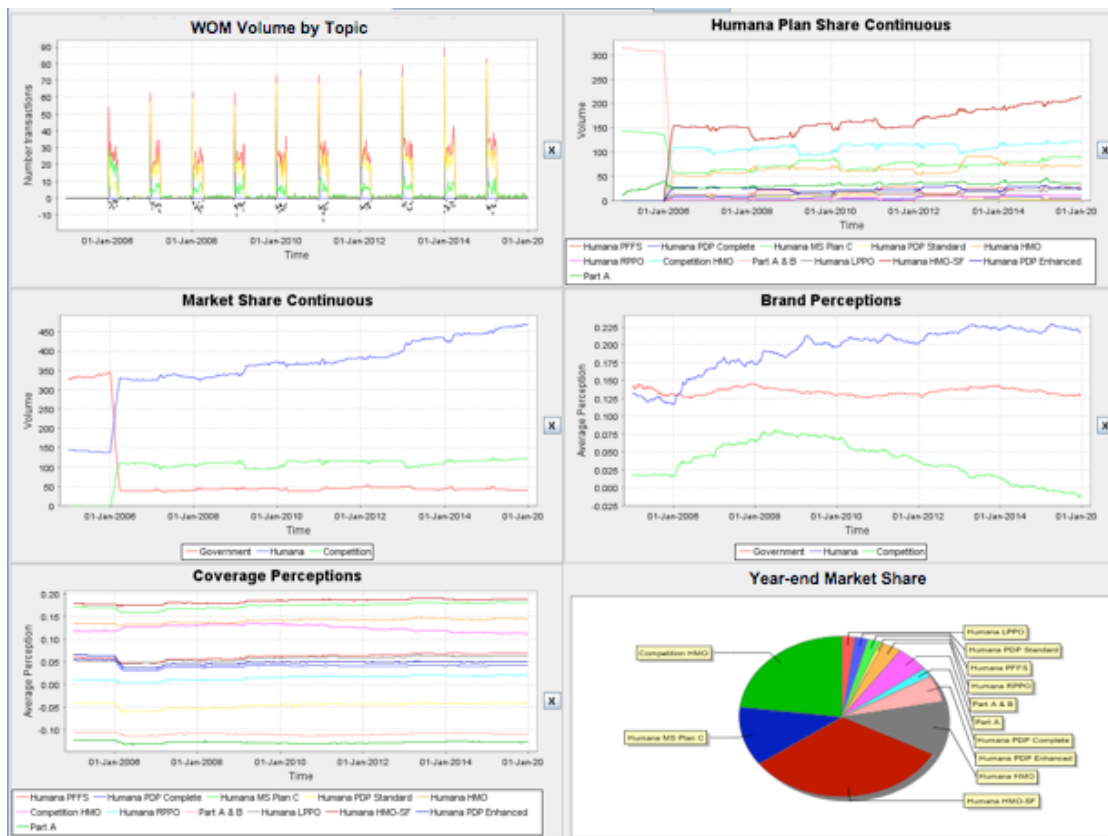
The table in the upper right corner of Fig.2 represents each Medicare plan for all existing providers, including the Government, Humana, and its competitors. Note that each Medicare plan is defined in terms of a large number of benefits: monthly premium, hospital deductible, hospital copay, deductible for physician visits, and so on. These plans can be read in from external files, or they can be created or modified directly through the graphical user interface. As we discuss in a later section, Humana is currently using an updated version of this tool to help its product managers design better plans. This can be

<sup>2</sup> A beta distribution is roughly bell-shaped but, unlike the Normal distribution, is bounded within a finite interval and is not necessarily symmetrical about its mean. A sample beta distribution can be seen in the lower left panel of the screenshot in Fig.2. The parameters  $\alpha$  and  $\beta$  determine the mean and skew.

done by changing the characteristics of each plan and seeing how it will impact the seniors' choices.

The panel in the lower right allows the user to specify marketing/communication activities for Humana, for the government, and for Humana's competitors. For this project our representation of marketing campaigns (or government campaigns to disseminate Medicare information) was simplified. In other applications we have implemented extremely detailed advertising calendars through which marketers can set up extremely detailed campaigns that include multiple channels, flighting, copy quality, budget, and other factors that are commonly used in the industry to define campaigns.

In a typical use case, a marketing specialist uses the software platform shown in Fig.2 to set up a desired scenario, i.e., initial conditions, marketing activities and other relevant parameters. The user then clicks the "Start Simulation" button to launch the simulation. Simulating a thousand agents on a week-by-week basis for an entire year only takes in the order of several seconds, even on a standard laptop or desktop. This makes it easy to run the same scenario multiple times to understand how robust it is to fluctuations, or to run multiple scenarios to see how different assumptions lead to different results.



**Figure 3:** Sample output of the reporting engine.

At the completion of each scenario, the software platform allows the user to visualize results through a flexible and powerful reporting engine (Figure 3). During the simulation all the data are stored internally or to a database. The reporting engine enables the user to select nearly any variable or any output metric, and display it either as a time series

(showing how that quantity varies during the simulated time period), or as a cumulative result. Note that the data in Fig.3 are for illustrative purposes only.

The ABM platform we developed for Humana offers a number of other capabilities, including the ability to focus on specific markets, and to interact with other software used by Humana for easy import and export of data.

#### **4 Summary of Results**

As expected, the model showed that all the types of WOM-like interactions influence the efficacy of advertising campaigns and other marketing activities, such as organizing informational meetings at community centers, or providing information through retail points. In some cases Humana already had available data to help us set the correct parameters. In other cases, Humana was able to obtain the necessary data. In yet other cases, there were no data available, but Humana was able to use the tool to understand which factors were most important, and where other data may need to be collected to improve the model's predictive accuracy.

We were able to analyze some market research data obtained by Humana, and used it to guide our parameter selection for how WOM impacts the decisions made by seniors. As an example, it was found through data analysis and simulation that seniors can be grouped into certain segments on the basis of their WOM actions and qualities.

Specifically, we found two interesting segments:

- 31% of seniors are healthy, young, and active. They tend to evaluate their healthcare options carefully (spreadsheets), have a close network of friends and listen to their doctor's advice. WOM in this group is very important, but is being used to gather information, rather than determine the choice directly.
- 15% of seniors are mostly older, unhealthy and inactive. They tend to make healthcare decisions based on others' opinions (high propensity). However, they also tend to have a much smaller network, possibly just immediate family. WOM here is also very important, but it influences the choice directly.

The initial version of the model provided a number of key insights that facilitated Humana's decision-making process, and which were borne out by the results:

- Even with significant inertia (the tendency to stay with the current provider), the model predicted widespread adoption of new plans; in fact, when the new plans rolled out, all providers experienced a dramatic increase in subscriptions, much higher than had been expected by industry analysts.
- WOM events between seniors can be used to emphasize specific plan characteristics; for example, our simulations showed that WOM events between seniors could triple the relevance of the amount of co-pay or co-insurance for Physician visits. In general, the sensitivity of a given plan element to WOM depends in a complex way on several factors, including how relevant that factor is to individual seniors, how often that factor impacts the seniors, and how much advertising focused on that factor.
- Marketing activities interact with WOM to accelerate overall adoption rates. We found in our simulations that adding WOM to traditional marketing could result in

an additional 5% of conversions of subscribers from a traditional Medicare to private health insurance.

It is important to note that because of the abrupt transition resulting from the new product launch, it was not possible in general to make a direct “before and after” comparison to make a quantitative estimation of the model’s accuracy. However, the model was used by Humana as a significant tool in its decision making process, and the overall results are quite compelling: after the launch of the new Medicare plans in 2006, Humana jumped from the sixth largest to second largest Medicare provider in the nation with plans in all 50 states, more than one million members in their PPO, HMO and PFFS plans, as well as 3.6 million members who joined their prescription drug plan. By comparison, in 2004 Humana had plans in only 16 states, and only about 377,000 Medicare subscribers.

While we cannot claim that our software platform was solely responsible for these impressive results, it was a key tool in their arsenal, and one that enabled them to make important strategic decisions with a high degree of confidence.

#### **4.1 Model accuracy**

One measure of accuracy was obtained during the process of developing the model, by running simulations over different markets under current conditions (before introduction of the new Medicare plans), and seeing how well the model predicted current enrollment levels. Note that this is non-trivial, because the assumptions built into the model specified things such as how sensitive seniors are to certain plan characteristics, how often they exhibit certain behaviors (including WOM actions) and so on. The actual number of people who elected to subscribe to each plan was thus an *emergent behavior* resulting from all the interacting factors. We were able to find parameters that, when taking into account demographic variation between markets, were able to get very accurate results across most markets.

Interestingly, a great benefit of using ABMs in this fashion is that when there are observed discrepancies between the model’s performance and real life, it is usually possible to “look under the hood” and figure out why. In one particular simulated market, the model was showing a significant discrepancy between predicted and actual enrollments, which required the model parameters to differ significantly from those used for other markets. After analyzing the results carefully with Humana, it was found that the sales incentive plan for Humana representatives in that particular market was different from the incentive plans in other markets. Closer scrutiny revealed that the incentive plan in fact was poorly designed, and encouraged sales reps to push one particular product at the expense of another. We were able to simulate this effect and completely accounted for the discrepancy using the “standard” parameters for the simulated seniors.

The importance of this capability cannot be overemphasized, and it represents a key differentiation from alternative modeling approaches: any model based on statistics uses information aggregated at a level that makes this type of analysis impossible.

#### **4.2 Beyond marketing: ABMs for product design**

A further sign of the success of our software platform is that Humana has continued to use it, and asked us to extend its use beyond marketing into product design. As described earlier, each agent has a set of relevances and perceptions, which reflect how the agent

feels about various plan characteristics, how it views different brands with respect to the plan characteristics, and how all these factors combine to influence how many agents will enroll in which specific plans by which insurers.

Having set up these simulated agents, Humana realized that they could use the same tool, with only minor modifications, to help them design better plans. Because of the large number of benefits available through each plan, there are many different combinations of benefits that, from a purely actuarial standpoint, result in an equivalent cost for Humana. For instance, one could hypothetically increase the hospital stay deductible and decrease the physician visit deductible, and – for a given market– the overall cost to Humana may be exactly the same. However, the seniors within that market may react differently to the two plans because of their relevances and preferences. Our ABM platform can simulate the impact of these “actuarially equivalent” plans to determine which has a greater probability of success in the market place by better matching the interests of the seniors.

Note that the success of each plan does not simply depend on the individual preferences of seniors – otherwise a simple linear, statistical model could be used for this purpose. The complex interactions between seniors and all other elements in the Medicare ecosystem jointly give rise to an *emergent* preference, which may depend in intricate and highly nonlinear ways on the specific changes to the plans. This type of predictive power is well beyond that of any other existing predictive model based on regression or other traditional statistical techniques. We are currently finalizing a version of the software that was adapted specifically to the needs of Humana product managers.

## 5 Conclusions

We have described here a case study in which we developed a software simulation platform using our agent-based modeling technology. In particular, we helped Humana to design and analyze its marketing strategy in preparation for the January, 2006 launch of its new Medicare plans including prescription drug coverage. More recently, we have extended the tool to help Humana facilitate its process for modifying plan design to maximize market penetration.

This project demonstrated that word-of-mouth is a significant factor in the decision-making process of seniors who are trying to select one among many different available health plans. We cannot emphasize sufficiently that this is quite different from a more typical, tactical WOM activity. In fact, there was no explicit attempt on Humana’s part to design WOM campaigns. However, the seniors’ selection process is strongly influenced by many types of WOM events, and understanding how all these factors interact was critical in helping Humana understand the impact of its marketing strategy.

Our project illustrated concretely some of the issues raised in the opening section, which we summarize again here:

- There are many types of WOM-like interactions, which can differ significantly from one to the other. Our model, which was based on a combination of data and our client’s domain expertise, included several types of WOM actions.
- There are many types of social networks, and each network influences the distribution spread, velocity and efficacy of WOM. This is particularly evident in the Medicare space, where seniors interact with many types of WOM participants,

including family, friends, physicians, representatives from the health insurance companies, and other types of individuals.

- Not all forms of WOM are effective in changing consumer perceptions; for instance, we mentioned how WOMUnits are used by some seniors simply to gather information, while other seniors use it to make decisions.
- WOM happens all the time and influences every marketing/advertising activity; this is almost a tautological observation – but the model showed clearly that turning WOM on and off had a direct impact on the predicted results.

It should be emphasized that these conclusions are not limited to the case study summarized here. In fact, they are based on lessons learned from several case studies in a variety of industries, including beauty products, restaurants and pharmaceuticals.

### **5.1 Can WOM be treated as a channel?**

With regard to the last bullet point in the previous section, we would like to suggest that treating WOM almost as a “channel” is misleading and often not accurate. The concepts of WOMUnits leading to conversion, consumption or relay of information can only apply in very restricted situations. In general, WOM events simply serve as a substrate that contributes to the complexity of how individuals make decisions about products.

In the present case study, there were no explicit conversions resulting from WOMUnits being created or relayed among participants. A WOMUnit in this case may simply have been someone’s opinion that the cost of hospital co-pays is more relevant than the annual deductible. This, in turn, might influence a participant to choose one Medicare plan over another. However, the WOMUnit is contributing in a very complex way to the overall perception, which in turn may or may not have led to someone’s decision to choose a particular plan.

Furthermore, WOMUnits may become “transformed” as they spread. Following the previous example, a senior may be influenced by several types of WOMUnits to determine that Humana is the best provider, and may then express this opinion as new WOMUnits to participants in its network.

There are undoubtedly some situations in which a more focused definition of WOM may be appropriate: for instance, WOM campaigns designed to introduce a new product, especially when the product may be a simple consumer good. However, we believe that the power of our approach is fully realized when one considers more typical situations in which WOM is one part of a complex web of interactions.

### **5.2 Comparing ABM and regression-based approaches**

It is worth reiterating here some of the key differences between our ABM approach and more traditional, regression-based approaches. One key difference can be summarized by observing that regression-based models try to identify *correlations* between variables based on historical data; in contrast, ABMs use historical data to identify *causality* in the sense of how consumer perceptions and behaviors cause certain observable outcomes. Once the proper causal relationships are identified, it is possible to test the outcome of entirely new products, as was clearly shown in this case study – something that cannot be done with regression-based models.

A second key difference is that regression-based models are based on assumptions of linearity and statistical stationarity. Linearity in this context can be interpreted to mean that if a certain action has a given impact, doubling that action should double the impact. Statistical stationarity simply means that the aggregate statistics measured at any time will not change at subsequent times. In other words, the future should be exactly like the past. In the real world there is plenty of evidence that neither assumption is accurate: feedback loops of the type created by WOM result in nonlinear effects (just think about the success of a viral campaign), and people's tastes and preferences change over time.

A third differentiator is that regression-based models aggregate data at a level that makes low-level analysis difficult if at all possible. If a regression-based model is found to have given incorrect predictions, explanations will be limited to trying to change aggregate values or presuming that certain correlations have changed. In contrast, with an ABM approach you can ask very natural, low-level questions: what happens if seniors talk about my product twice a week instead of once a week? what if my competitor launches a similar product? how will seniors react if we reduce monthly fees by \$5 and increase hospital co-pay by \$10?

Finally, regression-based models are *static*: there is no flow of time. In contrast, an ABM is a dynamic simulation that captures changes occurring on a moment-by-moment basis. In the real world, timing can be critical: for instance, running a TV ad for four weeks is likely to have a different impact than running the same ad for two weeks, pausing for two weeks, then running it for two more weeks. As a different example, launching a new product or new marketing campaign two months before or after your competitor can make all the difference in the world.

### **5.3 WOM and ABMs as strategic tools for marketers**

In all, we believe that in the next few years WOM is going to shift from largely tactical activities to playing a more central role within marketing planning and strategy. The increased availability of information through electronic media is causing a shift from brand-driven to consumer-driven information sharing. One impact of this shift is a dramatic increase in the complexity of the dynamics of consumer markets.

The increased complexity of today's communications is beyond the capability of existing regression-based tools. Hence a critical step in this direction is the creation of quantitative tools that can help decision makers understand how all these factors work together to influence consumer behavior. The adoption of quantitative tools of the type we have developed will also be driven by the current shift away from commission-based and toward a performance-based compensation for agencies, which again requires a sound, quantitative approach to measurement and evaluation of performance.

The case study reported here shows the power of our ABM approach. We have successfully deployed similar platforms for three international agencies and several Fortune 500 companies. In all cases, our clients have found the ABM approach to provide a degree of clarity and understanding that makes it ideally suited for strategic analysis, testing what-if scenarios, and overall gaining a much deeper understanding of how to optimize their resource/budget allocation. We believe that this approach will someday become a standard component to help marketers with their planning and strategy.