



The Evolution of **Agent Based Simulation** in Corporate **Strategy**

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From the foundations of corporate strategy to agent based simulation

Corporate strategy as a discipline originated around the early 1960s when Alfred Chandler introduced the idea of pulling all management activities under one all-encompassing strategy. With this he also stressed the importance of taking a long term view. This was probably the easiest way to shift the entrenched middle managers to grasp the “big picture”. Chandler showed conclusively that a long term coordinated strategy was necessary to give a company structure, direction, and focus; and coined “structure follows strategy”. Chandler also managed to rip a lot of frictional cost out of the organizations by addressing conflicting and often petty interests and this naturally lead to higher efficiencies.

Fixing the internal working of an organization neatly prepared the world for the work of Philip Selznick (1960) who introduced the idea of matching the organization’s internal factors with its external environmental circumstances establishing the beginnings of what we now call a SWOT analyses. Peter Ansoff took the concept of internal-external congruency further by expanding it to market penetration strategies and horizontal and vertical integration and diversification strategies. He felt – like we still do – that management could use these strategies to systematically prepare for future opportunities and challenges. Peter also introduced the popular “gap analyses” methodology.

Peter Drucker took a step back from this and stressed the importance of business objectives. An organization without clear objectives is like a ship without a rudder. This evolved into his “management by objectives” theory. His second critical contribution came from identifying intellectual capital as a competitive advantage. Key to this insight is that knowledge is non-hierarchical and team centric with the most knowledgeable person in the team being the temporary leader.

Corporate strategy soon evolved to confront the challenges of size, growth and portfolio theory, the PIMS (Profit Impact of Market Strategy) studies started with GE which tracked corporations for 20 years. These studies show clearly that there is a correlation between market share and rate of profit through economies of scale and as such validated the hypothesis that size does matter. Size also provides experience and learning curve advantages. PIMS is still the best validated quantitative study around.

Growth strategies continued to evolve and the relative advances of horizontal integration, vertical integration, diversification, franchises, mergers and acquisition, joint ventures and organic growth were studied. Soon after Schumacher and others showed how smaller niche players obtained very high returns. By 1980 the conclusion that high market share companies and low market share companies were often very profitable – but companies in between were not. This was coined the “hole in the middle” problem by Michael Porter.

The next major break-through came in the field of portfolio theory. Analysts concluded that a broad portfolio of financial assets could reduce specific risks. This was soon extended to product portfolio models and operating divisional portfolios. Several techniques were developed to analyze the relationships between elements in a portfolio like the BCG Analyses from Boston Consulting Group and GE’s multi factorial model.

Strategists however soon realized that these business units are frequently more valuable as independent companies than business units in a portfolio.

By the 1970s business executives started to get scared of the Japanese successes and Edwards Demming cashed in with his superior control techniques. But it was Richard Pascale who produced a better mouse trap with his development of McKinsey's 7S framework: Strategy, Structure, Systems, Skills, Staff and Shared Values. This helped tremendously as American companies did not place great value on corporate culture, social cohesion, shared values and beliefs in the workplace.

Thanks to the Japanese industrial success, US strategists developed a series of new interpretations to gain competitive advantage, Gary Hamel and C.K. Prahalad shifted strategy from passive back-office functions to a more active and interactive process. They were the first to move strategy from an arm chair activity to a dynamic activity seeking to leverage the company's core competencies. It was from this work that VCI developed its commitment to always make the company executives the company's key strategists.

Michael Porter introduced his Five Forces as a method for mapping the industry and thus gaining a sustainable competitive advantage. He follows Chandler's earlier dictum that structure follows strategy but adds that strategy should follow industry structure. Porter also defines three generic strategies: Cost minimizations, product differentiation and market focused strategies. Building these elements into the VCI models help to define the optimum competitive eco-system to be stimulated.

It was John Kay who around 1993 added a financial level to the concept of Porter's value stream and introduced the notion that "adding value is the central purpose of business activity", where value add is the difference between input costs and market prices. Kay claims that the role of strategic management is to identify core competencies, then assemble a collection of assets that will increase value-add and provide a competitive advantage through three types of capabilities, innovation, reputation and organizational structure. The 1980s also saw the widespread acceptance of positioning theory.

According to Al Ries, the basic premise is that a strategy should not be judged by internal company factors but by the way customers see it relative to the competition. Crafting and implementing a strategy involves creating a position in the mind of the collective consumer.

Several techniques were applied to positioning theory, some newly invented but most borrowed from other disciplines. Perceptual mapping for example, creates visual displays of the relationships between positions. Multidimensional scaling, discriminant analysis, factor analysis and conjoint analysis are mathematical techniques used to determine the most relevant characteristics (called dimensions or factors) upon which positions should be based, preference regression can be used to determine vectors of ideal positions and cluster analysis can identify clusters of positions.

Arie de Geus played with similar concepts around the end of the 1990s identified four key traits of companies that had prospered for 50 years or more:

- Sensitivity to the business environment – the ability to learn and adjust
- Cohesion and Identity – the ability to build a community with personality, vision and purpose
- Tolerance and decentralization – the ability to build relationships
- Conservative financing – no surprise here!

During the same period, J. Moore introduced the metaphor of the strategic organization as an ecological theory of predators and prey, a sort of Darwinian management strategy in which market interactions mimic long term ecological stability. This concept is widely adopted in current eco-systemic mapping and VCI uses many of the most advanced techniques to map industry eco-systems for our simulation projects.

To deal with change and unpredictability, Kees van Heiden (1996) introduced scenario planning to make optimum strategic calls. Peter Schwartz claims that strategic outcomes cannot be known in advance so the sources of competitive advantage cannot be predetermined. The fast changing environment is too uncertain for us to find sustainable value in formulas of excellence or competitive advantage. Pierre Wack asserts that scenario planning is about insight, complexity, and subtlety, not about formal analyses and numbers.

VCI uses scenario planning as its foundation and thus are able to leverage both the scenario planning advantages and the analytical advantages in its strategic planning methodology.

Global volatility brought the introduction of complexity theory to strategy making. Complexity theory involves multiple agents interacting in such a way that a glimpse of structure may appear. Holland, Kelly, Allison and others call these complex adaptive systems. This can best be done when “there are many participants, numerous interactions, much trial and error learning, and abundant attempts to imitate each other’s successes”. In 2000, E. Dudik wrote that an organization must develop a mechanism for understanding the source and level of complexity it will face in the future and then transform itself into a complex adaptive system in order to deal with it. VCI is the first company that expressively adopted the capabilities to make this concept a reality by developing the complex systems digitally and then through “abundant attempts” of simulation discern the best strategies.

The unfolding of an information and technology driven world brought the understanding of the importance of flexible, decentralized structures, work teams, knowledge sharing and the central role of the knowledge worker. Senge claimed the following characteristics:

- People can continuously expand their capacity to learn and be productive
- New patterns of thinking are nurtured
- Collective aspirations are encouraged
- People are encouraged to see the “whole picture” together (systems thinking)

Regis McKenna perhaps took this too far, but he saw a world where information technology creates an age of “real time experience”. The “Now” is all that matters, demanding dynamic pricing, immediate service, customized to needs and will include premium pricing – he calls this concept time based completion.

Sticking close to the technology sector, Kaplan and others started to push for a more comprehensive view of strategic management and introduced the balanced scorecard which measures several factors including financial, marketing, production, organizational development, and new product development in order to succeed.

From this set of strategic building blocks we are confronted with the simple problem of the utility value of strategic knowledge, and thanks to Herbert Simon we understand the cost of perfect knowledge. Bounded rationality leaves the executive team with too few and too slowly produced strategic options and it was simply too expensive to attempt better or faster options. In this rapidly globalized volatile world, executives need options that are intelligent, fast and frequent. The strategic space is now broad dynamic and evolutionary as competitors react to initial strategic moves.

The second challenge to overcome is the tension between the hard and the soft factors of strategy. This difference can be traced back to decision styles and personality traits. But what was defined as quintessentially American (analytic) vs. Japanese (behavioral) is not really the case. What is known is that overtly analytical strategy making usually removes the executive from the strategic process and therefore the project missed the opportunity for discovery of the really deep insights that come through emersion. In general terms there are two main strategic approaches which are opposite but complement each other in many ways.

The analytical strategic approach:

This approach is based in economic theory and deals with the strategic issues relating to competitive rivalry, resource allocation and economies of scale. To fulfill these strategies the approach works with assumptions of rationality, self-discipline and profit maximization.

The intuitive strategic approach:

This approach essentially deals with human interactions and it uses, as its base bounded rationality, satisfying behavior and seemingly profit sub-optimal. A good example of a company operating like this is Google.

VCI’s approach:

VCI’s approach then is quite different from past endeavors in many ways. It attempts three significant shifts in strategy making: the actors in the process, the breadth of options considered, and the speed by which the strategy is crafted.

Defining the new framework - The Executive team at the strategic core

The advantage of an intuitive strategic approach is that executives are joined in a conversation that essentially is visionary, yet seeks to map the competitive eco-system. This involvement draws upon the deep wisdom and insights of the most experienced and accomplished persons in the organization.

The disadvantage is that the planning process is often short on factual rigor – many times it seems that the participants do not want facts to spoil their positive aspirations. Obviously the advantage of a deeply factual discussion is just that – the necessary analytical work has been done, and the management team can evaluate and compare their company’s performance from a reasonably objective standpoint. But there is also a dark side to an overly analytical strategic process. In these planning sessions the executive team has all pertinent information at hand, but it is usually so dense that little, if any, strategic insight can be drawn from it. In fact, most of the planning time is spent challenging, verifying and explaining data and not on divergent, creative thinking.

VCI facilitates the collaborative development of intelligent strategy making models. The process starts with the building of an ecosystem (the world in which the company operates) developed with participation from the executive team.

A simulation model is developed with the “agents” behavior derived from both the executives’ insights and supporting research. It is the engagement and interaction of the executive team with the dynamics of the model that give us a much higher quality end-product. The executive teams actually become de-facto strategists with the simulation platform as their chess board.

So the first layer represents systemic linking, or weaving together, of executive insights and computational processing power to rapidly hypothesize and test potential value accretive or value destroying choices. From previous strategic work, we learned that people are different and base their decision making on different types of patterning.

VCI’s work represents the next level of understanding the economic and strategic systems within which executives make decisions. The work is very much focused in “humans in the loop” kind of simulations. Our work is often used when strategic choices become so intertwined and complex that it is virtually impossible to separate fact from fiction. By developing “agents” from the foundation up, we are able to rationalize strategic options and simulate many possible outcomes. This provides the executive team with a much clearer picture of what outcomes may be expected based on what strategic decisions. Changes in the real world are also easily integrated into a model to cause a continuous “real” strategy play.

Given that business systems are dealt with by all sorts of decision makers, each person with his or her own biases, preferences and beliefs, this kind of simulation based planning is proving to be a powerful tool that brings the whole senior team together in a common understanding of the opportunity and the outcome of a particular strategy. The executive team is able to easily value business strategies in real time during strategic planning meetings. Agent based modeling and simulation is imminently useable because of this very iterative model construction process.

Testing the model involves running it and comparing the results with real world facts. The behavior definitions of the agents are then updated and the model is rerun until it reproduces both the behaviors and results of the target system. Once this is complete, we can use the model to answer the executive team's strategic questions. The model becomes an important strategy tool, but the process of developing the model also greatly increases the team's understanding of the environment within which it operates.

Allowing the executive team to work with the growing model also encourages early and regular feedback. This informed feedback allows the development process to be both dynamic and focused. Insights gained from model development can be immediately applied to future development. This ability to adapt the models fast is essential as the world often changes before the model is complete. Applying the insights discovered during model development to future strategies is equally critical since agent based modeling intentionally involves learning about the system being modeled. In addition, receiving feedback allows executives to ensure that the model development process is always on track for success.

So many variables and options

Turning back to the intellectual challenge for us humans – bounded rationality – we just cannot process all available data. At best a person can process about seven variables simultaneously – on average we can manage three. Strategic crafting includes hundreds of variables that need to be balanced, optimized, and weighed against each other.

To top that, strategy happens in a real world environment, not some static war room environment. Every day the competitors, the stock market and the global playing field shift. The successful strategy has to include these variances in its construct even under the external pressures of daily production pressures and quarterly financial reporting.

The VCI platform helps overcome the deepest barriers to strategy making – it leverages the best brains in the company, it casts the strategic options net much wider and it does that faster than any other methodology yet invented. This new platform provides the user company with a definitive competitive advantage.

VCI essentially extends the approximately seven variables that the individual can simultaneously process to several hundred elements within the problem statement's space. So, the second advantage of agent based simulation is simply that it enhances the executives' pattern making capability by including a wider network of forces and stake holders. The simulations do not see the patterns, it merely plays out the future many, many times over which allows the executives to see the patterns clearer, or perhaps reveal patterns that were never visible before.

This changes the odds for a decision maker from randomly being lucky to consistently being better than average. In popular music the random luck ones are referred to as "one hit wonders". Anyone can be smart once, it is about the repeat game and staying ahead that every CEO is concerned about.

Speed is of the Essence

The significant contribution of VCI's work to agent based models for strategic planning is that the simulations allow executives to imitate one (real and very slow) system with another (synthetic and very fast) system. So instead of hoping to grasp the full value of a decision sometime in the future, we bring those futures forward for valuation and implications studies. If a manager with 10 years of strategic planning experience is good, what then is the value of a manager who had experienced say, a hundred years' worth of simulated strategies?

Today's Complex Strategic Challenges

Simulation based strategy making is essential because the current commercial challenges are different to a few decades ago. Globalization has increased the complexity of strategy making far beyond the optimistic projections. A few examples may include the fact that our "free market" system is now the playing field for centralized governments like China, pseudo-corporations, fronts for nationally/politically managed companies/funds and very ambitious new ideologues from Venezuela and Russia flush with energy and resources cash. The free market system based predominantly on a profit motive has now become quite veiled.

Another dynamic unfolding is simply the vast numbers of first generation players entering the market. Think of it; from one billion people participating in the global free market a decade ago to more than four billion players expected to enter over the next few decades. The complexity of this expansive growth is beyond the capability of any traditional strategy formulation as regions, infrastructure developments, industries, markets and finances shift and migrate continuously seeking the best economic and political constructs.

Think innovation

Every new entrepreneur comes to the market believing he or she has a new or better way of delivering products or services. And the fact that the most new entrants are first generation means there are many, many more new ideas coming to market – none bounded by traditional western "rules of business". This risk is more than just innovation, it is the fact that the vested players are usually less likely to adapt and will more likely attempt to hold on to their established competitive advantages. This is known as conservative play by current incumbents and is the behavior that accelerates change as it leaves a strategic vacuum for new entrants to develop their skills and business acumen. It is no surprise that a generalized view will show repeatedly that vested incumbents lose much more than just their relative market share during any industry-wide growth spurt or rapid downscaling.

Business transparency brought about by Sarbanes Oxley in the US, information technology in general, the diligence of the press, the curiosity of our business schools and the exhibitionism of corporate executives is rapidly leveling the playing field between old, experienced players and the new global entrepreneurs.

The new organization, according to Manual Castells is characterized by:

- Globalization
- Organizations structured as a network
- Instability if employment
- Social divide between those with access to information and those without

These characteristics of a networked organization certainly do not represent most large corporations of today. The challenge facing every executive team is how to link the external changing and complex world with the internal capability of the company. This paper attempts to show the first step in adapting any company is through a coherent strategy. Using a simulation platform is shown to be the most advanced method in developing such a strategy as it leverages both the business leaders and technology in a new symbiotic relationship developing robust and fast strategies.

VCI is a firm that is specifically focused on bringing the best and most advanced strategic planning methodologies to the boardroom to provide executive teams with the ability to stay ahead of their industry's growth curve.

To learn more about the role of agent simulation and the importance of strategic business positioning for your organization, please contact any one of us and we can discuss the relevance of this process to your situation.

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