Game Theory in Management
Modelling Business Decisions and their Consequences

MICHAEL HATFIELD

http://www.gowerpublishing.com/isbn/9781409442417
Win Using the Rules of the Game

It's alright to disagree with me, because I've been disagreed with before, and you've been wrong before.

William F. Buckley

There’s a certain arrogance involved in writing books on management. The starting point these authors are using assumes, at some level or in some area of expertise, that the reader isn’t as good at managing their affairs as is the author. It only gets worse when epistemology – the study of knowledge and its limits – is thrown into the mix, because now we’re not just talking about a supposedly superior way to manage, we’re pushing forward a supposedly superior way to think!

That having been admitted, I kept coming across what Nassim Taleb calls “flawed tools of inference” while I was researching my previous book, Things Your PMO Is Doing Wrong. In fact, the entire first part of that book deals with commonly-used, but ultimately futile, tactics in setting up a Project Management Office (PMO) and attempting to further project management expertise within the macro organization. And the use of those flawed tactics lead to more than your garden-variety frustration in setting up a functional PMO: without a sufficient project management capability, projects come in late, over cost, wasting time and money, and ruining careers.

I observed something I thought was very interesting among my classmates while I was pursuing my MBA. We were subdivided into teams, and these teams stayed pretty much intact throughout the two years it took for us to graduate, except when members left the program. We were told on the first day of the first class that fewer than half of us would make it all the way to graduation, and I remember summoning a resolve to graduate on time, while fully executing my duties to my young family and full-time job. But it wasn’t a conflict of duty or time that led to many of my classmates leaving the program. After a couple of introductory classes on Strategic Management and Organization Behavior and Performance, we got into the thick of the curriculum, with two classes each of Accounting and Finance. Graduate Statistics was next up for the MBA candidates, but a member from my team decided to leave at this point, not because she couldn’t keep up, but because she believed that the most important aspects of management were in the realms of Finance.

and Accounting. She was going to change her coursework so that she could become a Certified Public Accountant rather than an MBA. We were sorry to see her go, but the rest of us hunkered down for Statistics.

After Statistics was Business Law, and the same thing happened again. A member of one of the other teams felt that protecting the organization’s assets from liability was the most important aspect of management, and left to study the law. I don’t know if he would end up as a lawyer, or if he even got into law school, but a definite trend was emerging. Two students left after the Management Information System course, to pursue careers as either programmers or system administrators. Each class instructor, being both highly educated and a practicing professional in their subject areas, had imparted to some students the notion that their take on their subject areas was the most important and, by extension, probably the most lucrative, even if this wasn’t provably apparent at that particular time. This competition of perspectives would claim easily as many dropouts as all of the other causes combined, and at our graduation ceremony, just as predicted, there were fewer than half of the people there than had been present at that first class.

I was no stranger to the battle of perspectives in the management theory world. I was working at the time for a contractor for a United States Government agency as a project control specialist, which involved setting up the cost and schedule performance information systems used to manage projects. At that time this particular agency granted their contractors some latitude in complying with the requirements on how these systems ought to be set up and maintained, and what the output of these systems should look like. By contrast, the requirements on how the accounting system should be set up and maintained were highly rigid and consistently enforced, and so the company’s accountants’ decisions always received deferential treatment on matters of how costs should be collected, how cost performance should be analyzed and reported, and a whole range of matters where clearly Generally Accepted Accounting Principles had no sway. The Project Management Institute® had been founded in 1969, and had created its first professional certification, the Project Management Professional (PMP®), in 1984 – two years after Tom Peters and Robert H. Waterman, Jr. released In Search of Excellence. Up until this point there was really no effective counter to the notion that the perspective of the accountants ought to dominate the realm of business decisions. But when I saw a tape of Tom Peters discussing the folly of myopically pursuing bottom-line strategies while ignoring even the slightest of customer-oriented actions, I realized that a massive change was underway. Here was Professor Peters mocking Sloan School MBAs, to their faces, for having adopted the very notions and perspectives they had learned from the most prominent business teachers in the land, and he was receiving standing ovations for it. Having received some weeks of training in project management information systems, I knew that I was on the right side of the coming sea-change, but I was still frustrated and stymied in my attempts to advance project management maturity within my organization. The accountants held all the cards. So, I decided if I was going to have any chance at all in the coming conflict of perspectives, I had to know what my opponents knew. With the company’s generous tuition reimbursement program, I signed up for the entrance examination to graduate business school, and pursued my MBA.

After graduating, I felt I had to be stronger in the project management realm, and so worked for and achieved my very own Project Management Professional certification, in

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3 This may have been one of the very earliest PMP®s that PMI® granted – its number is 1004.
1992, followed quickly by a Certified Cost Consultant certification from what was then
known as the American Association of Cost Engineers, or AACE (now the Association
for the Advancement of Cost Engineering, International. I guess they wanted to be
more cosmopolitan). Within a few years I was writing a monthly column for PMI’s trade
magazine, PM® Network. The name of the column was “The Variance Threshold,” and
they put me on the back page where I had remarkable latitude to make fun of anything I
wanted in the management realm, and, brother, was there a mother lode of material for
the taking. From early on, though, I was poking fun at the narrowness of vision exhibited
by “our friends, the accountants” (as I often described them). But I’ll never forget an
exchange I had with my wife (who also holds an MBA, though from a different school)
leading up to one of my columns:

Hey, babe, in my next piece I’m going to advance the idea that the overall goal of management
is NOT “maximizing shareholder wealth.”

What?

Yeah, if there was one common theme that all my professors were comfortable with retreating
to, it was those three words. But I’m beginning to think they’re not valid.

If you assert that, or anything like it, you’ll lose all credibility, and PMI will drop your
column.

Yeah, maybe. But I think I can make it entertaining enough so they’ll print it.

Good luck.

As it turned out, “The Variance Threshold” was a pretty successful column over its 11-year
run. Some of that success had to do with my being irreverent, or turning the occasional
phrase. But I’m also pretty sure that much of the column’s success had to do with my
asserting unequivocally that there is a fundamental difference between asset management
and project management, and that recognizing these differences was crucial to the ability
of managers within the organization to make informed decisions.

Flash forward to the spring of 2010. My older son invited me to read one of his
textbooks, A Beautiful Math, by Tom Siegfried. Its subtitle is John Nash, Game Theory, and
the Modern Quest for a Code of Nature. A Beautiful Math draws heavily from John Von
Neumann and Oskar Morgansters’ book, Theory of Games and Economic Behavior, which
was published in 1944. Von Neumann is considered one of the most brilliant thinkers
of the twentieth century, and Theory of Games is the starting point for virtually all of the
ensuing work in the field. A profound refinement in Game Theory was introduced in
1950, by the aforementioned John Nash. In Equilibrium Points in N-Person Games, an essay
in the Proceedings for the National Academy of Sciences, Nash introduced what would
later be named the Nash Equilibrium (I will cover the basics and nuances of these terms
and ideas in Part 1 of this book). With the introduction of the Nash Equilibrium, Game
Theory began to find applications in a wide variety of disciplines, including medicine,
traffic control, economics … and business and management. As referenced in the subtitle,
Siegfried not-so-subtly asserts that Game Theory, when combined with Network Theory
and the statistical analysis techniques that support modern Risk Management Theory, might actually be able to produce at some point in the future a Code of Nature. This Code of Nature is essentially an overarching theoretical structure that can explain not only how current processes produce current events and phenomena, but can predict future events and phenomena, similar to the psychohistory concept introduced by Isaac Asimov in the *Foundation* series in (coincidentally?) 1951.

For those of you who are not partakers of science fiction, *Foundation* takes place in a future where the Milky Way galaxy has been colonized by humans. A scientist name Hari Seldon develops the concept of psychohistory, a highly-advanced mathematical structure which can predict the future, but only in very large populations. The most common analogy used is that of the impossibility of predicting the behavior of a single molecule of a given gas; but, given a sufficiently large sample, predicting the gas’ behavior becomes simpler and easier. In the series, Seldon predicts/calculates that a civilizational collapse will come about, and hopes that the ensuing 30,000 years of Dark Ages and barbarism can be reduced to a single millennium by sequestering away knowledge and technology in a safe haven, to have it re-introduced at an appropriate time. One additional critical aspect of the story in the *Foundation* series that the Game Theory practitioner will need to know is that the Seldon plan is almost completely undone by the unexpected appearance of a character named The Mule, who has mutant powers of mental persuasion. Since The Mule is a mutant, his sudden appearance and success in conquering the galaxy could not have been predicted or calculated using psychohistory.

The essence of Game Theory is to evaluate which set of canned strategies are most likely to be used by participants in some form of interaction (or game) in a common environment, which is why, no doubt, it is so attractive to those seeking a Code of Nature. Sitting as it does on the cusp of explaining why things are the way they are (Game Theory is very popular among Darwinists) and predicting how things will be in the future, it does present as an overarching structure that explains and predicts all things, or at least those things that come about (or will come about) when the interactions are economic in nature, and the common environment is the free market. This is also why Game Theory so readily incorporates current Risk Management Theory, since Game Theory evaluates which set of canned strategies is most likely to be employed.

But then a funny thing happened on the way to the successful implementation of the Seldon Plan. Nassim Taleb wrote *The Black Swan: The Impact of the Highly Improbable*, and it became a *New York Times* best seller. In *The Black Swan*, Taleb doesn’t merely overturn the notions of some confab of Game Theory, Risk Management Theory, and Network Theory coming together for some usable Code of Nature; he thoroughly deconstructs them, and reveals the illogical underpinnings of the lot. I will cover Taleb’s counterpoints, ripostes, and assertions in detail in Part 2 of this book; for now, suffice to say that *The Black Swan* provides a clear upper-boundary to the limits of the utility of Game Theory and current Risk Management Theory, and these limits are far, far lower than current practitioners realize. Indeed, if a simple majority of the assertions contained in *The Black Swan* are valid (and I believe that a vast majority of them are), then the entire section on Risk Management in *A Guide to the Project Management Body of Knowledge®,* and any and all of the literature that agrees with it, is almost certainly suspect, at the very least.

So, in writing a book on the theory of games and management behavior, my goal was made clear for me early: define those circumstances and environs where modeling behavior and events, calculating Nash equilibriums, and evoking a particular set of
canned strategies was appropriate, and asserting a clearly articulable acid-test that could show where these types of analyses are a complete waste of time and money. Similar to the structure in *Things Your PMO Is Doing Wrong*, this book is divided into three parts: Part 1 will cover the basics of Game Theory, as well as accompanying tangential Risk Management and Network Theory ideas, and will make the case for those times and places where they can lead to informed managerial decision-making. Part 2 will review Black Swan theory, and show exactly where Game Theory’s limits are, and how current practitioners of both Game Theory and Risk Management have advanced their notions so far beyond their appropriate application domain that they are threatening to becoming utterly fraudulent as currently practiced. Part 3 will thread the theoretical needle, and offer a testable structure for correctly using Game Theory in management to deliver better informed (and, one would hope, more insightful) managerial decisions.

And with that, let’s tackle game theory in management.
This part of the book will show how some of the assertions in Part 1 are wrong; well, maybe not wrong, but have a limit as to their efficacy, and that this limit can be reasonably assessed and quantified.

In Chapter 5, I discussed the appropriate function and use of management information streams within the confines of types of management, and how, when those information tools are used outside of their appropriate domains, inefficiencies and irrelevancies manifest. But with many of these information structures and constructs, similar inefficiencies and irrelevancies can (and do) develop, even when they are used as intended.

One of the problems with taking on epistemological issues within Management Information System (MIS) theory is that these MIS streams often have their own groups of supporters, supporters who have oftentimes benefited impressively by overselling their MIS stream’s capabilities. I’ve already discussed the difficulties I’ve encountered when asserting the estimators’ tools’ incompetence when attempting to predict the future, even though such an assertion is demonstrably true. But that’s only the beginning of the fracas. As I discussed earlier, while I was earning my MBA, the common thread among virtually all of my professors was what they held to be the ultimate point of all management actions: to maximize shareholder wealth. It was positively axiomatic among the lot of them; however, we have seen that, while this may be the ultimate point of all asset managers, it’s hardly the ultimate goal (or even consideration, really) of the project manager, or the strategic manager. But the business world has been so imbued with the asset managers’ approach to organizational success that even their terminology dominates the decision-maker’s lexicon. People who would not have a clue on how to read a profit-and-loss statement will refer to the perceived end-state of a process as “the bottom line.” The insanity has reached the point where project management practitioners will repeatedly attempt to justify their type of management using the asset managers’ tools (a Yahoo! search on “ROI” and “Project Management” yielded over 1.6 million hits on September 6, 2010). Referring to the widget project example in Chapter 5, recall the calculation for determining a Cost Performance Index:

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\text{Cost Performance Index (CPI)} = \frac{\text{Value of Work Performed}}{\text{Amount ($) Spent}}
\]
Now, compute the CPI of, say, a company vehicle. See? It’s impossible, because the asset does not actually accomplish any work itself, but can only be used in pursuing the project’s objectives. And, if the PM tool is irrelevant in the assessment of assets, why should the reverse be considered any more relevant? But so entrenched is the asset manager’s vernacular and approach in the management world as a whole, such misapplications are common, even rampant.

So, in tackling the study of the limits of knowledge – epistemology – as it pertains to the world of business in general, and Management Information Systems in particular, I am certain to directly and severely challenge many of the groups of people who have combined into massive multi-player online role-playing game-like guilds, supporters of and adherents to the payoffs of their selected information stream and technical approach. All of these structures and approaches have limits, past which they return less and less relevant information, until they pass foursquare into the realm of misleading information.

In short, the purpose of Part 2 is to overturn much of the conventional wisdom with respect to the true utility of various common technical approaches to management, and the information streams that make them possible. So, with no further ado, let’s let the deconstructing begin.
PART 3

The Structured Solution

*Luck is the residue of design.*

Branch Rickey (1881–1965), *Lecture title, 1950*

Throughout Part 1 of this book we examined the power of Game Theory, and its promise to approach the attainment of a Code of Nature when combined with Risk Management, Network, and organizational archetyping (as in Maccoby’s work). Part 1 also reviewed the staggering success enjoyed by Enron during the California energy crisis as they were in a better position to play the de-regulation – of a commodity game than the California legislature, and the potential economic success that could be enjoyed by those familiar with the theory of games in management.

Part 2 evaluated the upper limits to the efficacy of these theories, going so far as to a near overturning of the claims of adherents of Game Theory, Risk Management, Organizational Archetyping, and virtually any structure that pretends to accurately depict future events or behaviors. As contentious as it may be, the following is indisputably true: Future events and people’s behavior – other players in the game – cannot be predicted with any reliability, no matter how complex the theories purporting to do so may be. But being in possession of timely, accurate, and, most important of all, relevant information can position the player to win, and win consistently, even against daunting odds.

But before the executive hands the keys to the boardroom over to the head of corporate computing, we have more analyses to perform. I’ve posited that the key to successful management is to be in possession of timely, accurate, and relevant information. Timeliness can be measured, as can accuracy. But what about relevance? The difficulty in testing for relevance is that there is a vast array of those who, in pushing the supremacy of their particular information stream way beyond the limits of its efficacy, essentially blur the lines of relevance, clouding the issue with assertions long on passion and short on logic.

As we discussed in the previous chapter, those doing the blurring of the boundaries of information stream relevance, for the most part, are not doing so out of a desire to deceive or confuse. They have built their narratives, structures that seem to explain their past successes and failures in a consistent fashion. These narratives are invariably chock-full of cognitive biases, most centrally the confirmation bias – they know that, say, keeping risk analysts around the project team well past the creation of the baseline was the key difference in bringing the project in on-time, on-budget, and any challenge
to this “knowing” can only be brought by the ignorant or incompetent. I discussed at length one of the more prevalent versions of this business-world pathology in my previous book, *Things Your PMO Is Doing Wrong,*¹ (PMI Publishing, 2008) the attempt to leverage organizational power or authority to compel the advancement of a particular capability. Managers with extensive military experience are particularly susceptible to this error, since, in their experience, that’s the way things got done, and the failure to get things done in a timely manner is ipso facto evidence of failure. Their narratives are set: deviations on their part represent weakness, and opposition from without must be overcome with any and all resources on hand.

What’s needed is an overarching structure, where information streams can be categorized and prioritized, evaluated with respect to their relevance, and tested for robustness and efficiency. Such a structure would also have to compensate for things as disparate as organizational culture and the interaction of the macro organization with an ever-changing, highly dynamic business environment. As we will see in the following chapters, a structure strong enough to place different information streams into their proper place in the overall information scheme – by its ability to test for relevance – while maintaining the flexibility to compensate for multiple organizations, industries, and business environs can not be one-dimensional. In order for this structure to have any relevance, it will have to allow the manager to evaluate its results with respect to all of the other components that contribute to timely, accurate, and relevant management information. And, finally, such a structure will have to account for that most coveted piece of management information: what is going to happen in the future? Or, more precisely, what future events is the organization most vulnerable to? To what events – random, or brought about by my organization’s decisions – is the competition most vulnerable?

As testing for robustness or vulnerabilities in our organizations – as well as others’ – leads to an ability to forecast likely future interactions, Game Theory reclaims its theoretical capacity to steer business decisions to ensure success. Note that we are completely abandoning the Von Neumann and Nash precepts of Game Theory creating a structure that allows the calculation of the most likely mixed strategies being employed by the other players in the future for a given game. By shifting the focus of Game Theory to testing for robustness or vulnerability, as well as relevance in information streams, we are not calculating Nagumo’s most likely strategy: we are discovering his vulnerabilities, and positioning our management decisions to take maximum advantage of those vulnerabilities.

So, without further ado, let’s explore this structure.