

Game Theory as a Negotiation Tool during the Cx Process

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Synopsis

The Commissioning Process is on-going during a project, and it moves through many phases as it evolves toward achieving its goal of delivering a Quality-Based product. Although this process may at first appear as a series of predictable commissioning-related events, there are in fact innumerable interchanges taking place that drive its progress. These occur at meetings and whenever an agreement is made, from the very first pre-design discussions about the Owner's Project Requirements to final assessments of the process's success years later. Within these interchanges, one can see structures of strategy occurring among the various participants as they utilize all kinds of individual methods to gain benefits for themselves. Insights into these interchanges using a Game Theory viewpoint may help understand how better negotiation methods might be employed to better help the commissioning reach its goal.

Though Game Theory is often discussed in terms of applied mathematics, it is effective in revealing how relationships function during interactions. It can be used to both analyze the strengths and weakness of "players" in the Game and realize how each player uses his own tactics to gain advantages. The Commissioning Process is in reality a huge "game" made up of innumerable smaller games with similar structures and patterns. This paper first gives a background of Game Theory concepts, applies Game Theory to specific aspects of the Commissioning Process, and exams in detail what can go on in exchanges during the Construction Phase. Its intent is to show how a Commissioning Authority with a simple working knowledge of Game Theory can influence all of the stakeholders in this phase to pursue the Total Quality Management goals that are the heart of commissioning.

About the Author

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ASHRAE Guideline 0-2005 defines The Commissioning Process as a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. But from a different perspective it might also be described like this: “Commissioning Process is a complex game with numerous participants intended to achieve quality in a project”. The declared final goal of the game is to deliver the project to the owner that meets their requirements but at the same time, each player in the game is looking out for his best interest and achieving the maximum payoffs for himself. As the game progresses, the various players may get adversarial, combative, or resistant, or they may be cooperative with each other. But the reason for their behavior at any moment is always the same: each one is acting to gain the most they can get out of the game.

In the above perspective, the process and goals of commissioning process are no longer the primary focus. Instead this perspective is considering the reasons as to why commissioning process is taking place at all. The participants in the process just don't decide to come and work together for the sole reason of creating a quality project. The Owners want the project to be successful, not just the process, and the participants want an individual gain be it self-satisfaction, reputation, or, most likely, a profit. So this paper is about stepping back from the commissioning process and looking at it from a removed perspective. By doing this, we may apply concepts of Game Theory to commissioning and get a better understanding how its dynamics work so that our negotiations can be more effective.

Game Theory

Game Theory is most often discussed in terms of applied mathematics and economics in which players with a set of values seek to optimize their winnings. It uses mathematics to set up a series of related values so that, when any of the relationships mutate or some values change, all of the other values are affected based upon a complex inter-dependency among themselves. As Game Theory is founded in mathematics using these relational values, it can provide a formal modeling approach to social situations where people are making decisions to get the most benefit they can for themselves. This modeling can be used to predict the possible effects and repercussions in a quantified way. So let's start by applying Game Theory concepts to a situation which is simple and informal, a situation all of us have been through in one version or another.

Buying a car at a dealership can be a grueling experience. There are two parties: you, the buyer, and the other person, the salesperson. You have money and you wish to exchange it for the maximum value or benefit you can. The seller has the car you may want and he wants your money. At the right price you'll buy it. So you negotiate, knowing that the salesperson does this every day all day, and that your biggest advantage is to walk away. The seller will try to increase the value of his car by pointing out all of its advantages, with the hope that at least some of them will make you think the car is more valuable. You on the other hand try to go the other way, or at least neutralize the salesperson's claims so the car's value is equal to the amount of money you want to part with.

This is a game of bluffing, of maneuvering, all to gain the maximum benefit to each party. To mathematically model the situation, you could break it down simply to this: when the value of your money equals a value the salesperson is willing to take for the car, then the exchange will happen. But it also might be refined to when your *perceived* value of your money equals the salesman's *perceived* value of the car; then the exchange can take place. So in its most elementary concept, it can be said that if Value A (the money) equals Value B (the car) the result is predictable. And of course the opposite is true: If the values don't equal, the result is also predictable.

But commissioning a project is obviously much more complicated than this. It's not just a simple exchange like a validated checklist for a release of a check. So let's give an example of a more complicated situation analyzed with Game Theory, just to begin to think of games where there's more going on than the example above.

The most classic example of such a game is the Prisoner's Dilemma: two suspects have been apprehended fleeing from the scene of a crime. Having been caught, both are charged with running away when they had been told to stop, but the police have no evidence to convict them of the much larger crime. So each prisoner is locked in a cell completely separate from the other, and each one is told the following: You can tell us that the other guy is guilty or stay silent. That's it. But here are the consequences:

- If both of you remain silent, you both get only six months jail time.
- If you stay silent, and the other guy says you are guilty, then he goes free and you get 10 years.
- If you say the other one is guilty and he stays silent, then you go free and he gets 10 years.
- If both of you say the other is guilty, you both get five years.

If they had known they were going to put in such a situation, it would have been pretty advantageous for both of them to agree to stay silent: that would result in only six months for each. But they can't communicate after the rules have been given, so they have to make their choice in isolation, considering what the other will say. And here's where the modeling shows up to make the prediction. With the understanding that a negative number indicates the jail time in years and the red number refers to Prisoner 2, the matrix below can be assembled. While we can do some logic in our heads and come up with scenarios and likelihoods, the model puts it in mathematical terms.

		Prisoner 2	
		Silent	Other Guy Guilty
Prisoner 1	Silent	-0.5, -0.5	0, -10
	Other Guy Guilty	-10, 0	-5, -5

In short, it predicts that, given the values of the choices, it is best for each prisoner to say the other is guilty. Even if they were both innocent, it is probably not a good idea for one prisoner to trust the other to say he's innocent. That's because the down side of fingering the other guy is either 0 or five years. Silence is worth only half a year, or a severe 10 years. But what's the possibility the other guy is going to stay silent? The numbers are right there to consider, but the model is to predict, but it cannot provide a definite answer. It shows the heart of the game is decisions based upon the consequences and the belief of what the other party will do.

An economic example of the Prisoner's Dilemma can be seen at automobile dealerships, not in the bargaining situation mentioned above, but in the way they try to get the attention of potential customers driving by. Car Dealer A decides he's going to spend the money to put strings and strings of helium balloons above his outdoor car lot. Dealer B next to him groans. Why? He is skeptical that strings of balloons will make any difference to his sales. But he can't prove that. Now he has the choice of either putting up balloons himself or possibly lose business to Dealer A. The problem is that now neither one will have the advantage if they both have balloons up and both of them now have to pay the balloon man for the displays. It would have been so much better if they both had agreed not to stick them up at all.

For us, the point of the Prisoner's Dilemma is not that situations can be reduced to this kind of modeling, which can suddenly become extremely complicated (imagine what would happen if there were three prisoners!). Rather it is important that situations can be broken down into a structure of varying values where the action of one party affects the decisions of the other to achieve benefits for each one.

A Horrible Soup

In the commissioning process as described by ASHRAE Guideline 0-2005, there are delineated phases with recommended goals and deliverables for each of the four phases: pre-design, design, construction, and occupancy. As we now are becoming aware of how relational values can be considered using a Game Theory structure, let's then begin by asking a simple question: Who are the participants involved with each goal of the phases?

For any goal in any phase, there may be a huge number of apparent participants. Just think of who the “Owner” of an office is when the Owner’s Project Requirements are developed in pre-design phase to set down the functional requirements of the project and the expectations for its use. It is not just the firm or company who legally owns the project. That firm will be considering how the project must be designed to best meet the needs of its intended users or occupants. That indicates many “sub-owners” within the formal Owner. In the design phase, there may be tens if not hundreds of parties involved to influence the design, all weighing in at different moments, and each trying to gain something for himself when he becomes involved with the project. The Construction Phase also involves hundreds of parties. And remember that the “goal” for one party may not be the goal of the other participants who can drift in and out as the process unwinds. In fact, the same party will have different goals at different stages of the process. It is a horrible soup we’ve found ourselves in, and we may ask how a lay person can even think of modeling any portion of the process using the concepts of Game Theory.

Fortunately there are other and less mathematical ways of using the concept of Game Theory. Most of us think in terms of a game intuitively without math many times a day. Dealing with teenagers and the family car is a huge and complex game where a gamut of logistical and emotional needs come into play and all kinds of strategies and deals emerge and evolve from everybody involved. We all can imagine situations when a single telephone conversation can rearrange the next actions that need to take place. In a constructed project there are always similar dramas as it moves through its phases towards completion and occupancy. In order to understand such complex, shifting games better, there are some basic concepts to characterize their structure. For those who can understand the structures, there is a much better chance of changing them to gain an advantage.

The Science of Strategy

In the book Co-opetition by Adam Brandenberger and Barry Nalebuff, Game Theory is applied to business structures and processes. One of the premises of the book is that many players in a game can increase their benefits by cooperating. This is the basis premise of the commissioning process. When we work as an effective quality-focused team, everyone benefits. The really important point is to learn how to be the one who plays the game in such a way that he gets satisfactory benefits for himself while allowing others to succeed. The authors above call Game Theory the Science of Strategy. Strategy is a series of decisions chosen, which one chooses to implement to come out ahead.

Let’s start examining some of the relational aspects of the “Science of Strategy” in the Construction Phase of the commissioning process. Let’s assume the commissioning authority(CA) has made it through the design phase for a large new building, and bid documents have been designed to get an acceptable bid from a General Contractor. One of the things the commissioning authority would like to establish is the Scope of the Game at the start of this phase. But that’s going to be almost impossible to involve all the players in the construction phase at the beginning of the phase. The problem here is that the whole commissioning process is a process in the dimension of Time and is constantly changing. And the whole project is a game: everyone participating in it, from the owner, the program developers, the design

professionals, builders, and the Owner's Project Management team to the lawyers behind the scene the bankers, the future operating staff, occupants, and maintainers. This makes the Big Game way too complex to think about right now in any specific way. The CA should look at the game as just the commissioning process in the Construction Phase, and when negotiations with individual parties are concerned, in much smaller segments. The Big Game in fact resembles a fractal with similar patterns that repeat themselves on each level of the process.

The remainder of this paper is to instill the concepts of Game Theory when the Commissioning Authority is faced with a situation that may appear as plus and minus for stakeholders in the project. The objective is not to formally construct a "Game Theory" model, but to use the underlying concepts to address problems or needs during the CxP to provide plus gains to all the participating stakeholders.

Players, Added Values, and Rules

Let's then focus on a commissioning kick-off meeting towards the beginning of the Construction Phase, and let's see how the game is formed up. The Owner's Project Manager calls and initially presides over the meeting, but turns it over almost immediately to the Commissioning Authority. Also at the table are the Head of the Operation and Maintenance Department, an engineer (or architect) from the Design Professional team, and two folks who are direct employees of the General Contractor. These are the Players, and each comes to the table with his own concerns, goals, and influence. Each one brings an Added Value, a stash of chips so to speak, which will influence the course of the game.

What's the strategy of the commissioning authority? Ostensibly in the moment, it's to make everyone aware of what commissioning will consist of on the job (even though it's described in detail in the Specifications) and how that translates into the tasks and deliverables of each party, especially the General Contractor. But it's also to kick up the urgency of getting the commissioning process underway among the contractors and setting the seriousness of its tasks. The contract documents are the guideline for the requirements that must be done, and thus they are the Rules at this point.

The first error in the above assumptions stated above is the idea of chips and the inference of a poker game. It's more like a street bazaar where everyone shows up with something different to bargain and trade with. The different parties all want to trade what they offer for different things, depending on their character and needs. Thus the Added Values of each party are different and valued differently by each of the Players.

To understand Added Values of the participants at this kick-off meeting, who has the least Added Value to the Commissioning Authority at this meeting? If I were the CA, I would think it's the representative from the Design Professional Team. That's because the Rules are the Contract Documents are set. Prior to this phase which he was actively involved with the bid documents, but he can't change them easily anymore. He also doesn't want to change them because he was paid to produce them and they represent both his expertise and his commitment to the ideas expressed in the documents. Prior to the bid, he had a huge Added Value role. Now

he's largely here at the kick-off meeting not to contribute, but to listen what's said in the meeting and judge whether there's anything to respond to, either at the meeting or afterwards. He may be seen to be the authority on the technical side of the project and the arbitrator in disputes, but he is bound by the rules he set up. It's been said that your Added Value is what you bring to the game. But another way to think of this is to ask what value is lost when you leave. The DP (design professional) gets a phone call and has to leave the room for half an hour. How does this affect what's going on at the meeting? Maybe not much. Or maybe some players think they can bring out issues they didn't want to when the DP was in the room. If so that indicates the DP had some value related to this meeting, because the Game changed when he left.

What about the Added Value of the Head of Operations and Maintenance? He has a huge amount. His Added Value is that he's going to be highly involved with determining if the project meets his needs. He represents part of the Owner, and he has requirements. Are all of his needs conveyed in the project documents? In theory, yes. In reality, probably not. Why? Because inevitably not every little detail is correct, and problems and the needs of the Owner will probably surface as construction goes on. There may be a code issue with the placement of a piece of equipment. There may be an access issue to equipment. The as-built drawing requirements may not have picked up everything the Facilities needs. At this meeting, the Added Value of the Operations representative is largely silent, but the CA knows how big the Value is in making the project a success. The satisfaction of the Head of Operations looms large as part of his strategy. The discussions at the table and the tactics of the CA will always consider the needs of that department and how to work with the person at the table representing them.

What's the Added Value of the General Contractor? As an entity, the Contractor has probably the most at stake. But here's a chance to consider the Added Value of those actually at the table. If the Contractor employees are the Quality Assurance Manager and the field superintendent, then their added value is probably not very large. Why? Because neither may have the authority or the influence within their company to drive the process in the way YOU want. Just because they are part of the major player, they may not be the people you want to play with, although they may be the key players representing the contractor, in which case you do want them on the team as game players.

But now let's change the players slightly. The Contractor's Construction Manager for the project comes out of his office into the conference room and sits down. He's a big player because he can make things happen that will greatly influence how commissioning will be approached by his company and his subcontractors. He's the one with the real leverage to make his subs conform to the directions of his Quality Manager. Then his boss, the branch manager of the Company, comes into the room. Oddly enough, he may not bring in much Added Value unless he's a micromanager. Odds are he will have to rely on his Construction Project Manager for providing the company's strategy. He's not without Added Value, but it's not as significant, even though he's the boss of a major Player.

Imagine then that the General Contractor has brought some subcontractors to the meeting: the plumbing foreman, the mechanical supervisor, the owner of the electrical firm, and the balancer. If you are the commissioning authority, you will discuss with them directly the expectations of

the commissioning project to this particular project. You are continuously “sizing up” how each of these Players can help you or get in the way of what you want to happen. You talk about the development of checklists and the need for interaction among the contractors. Ten minutes into the meeting, the Project Manager of the control system shows up. This could really change the game, depending on the PERCEIVED value of this person by the different people at the meeting. And you know, depending on how the control contractor plays his own game, his Added Value will change, especially when you see he’s going to be driving the bus when the mechanical systems are commissioned, and providing the trends and performance of the EMS (automated building control system, defined as the Energy Management System) as well the monitoring of the electrical and water meters. If this person from the Control Contractor has proven to be an ally before and someone you trust and work well with, his value to you is even more. If the Project CM picks this up, he knows he could have leverage over the process because the control contractor works directly (or indirectly) for him, and your favorable opinion of the controls person is something he can play to his advantage. But if the control contractor comes off as hostile or was shown as incompetent on previous job, his Added Value is still there. But the game for you is different. It’s also different for the General Contractor.

And it’s different to all of the other people in the room besides the General Contractor. The owner of the electrical contracting company may not see much added value on the control person one way or another because the effect on his work (and his goals) isn’t very great. It’s a matter of perception. What if there’s a balancer at the meeting? He has Added Value because he sets the installed mechanical air and hydronic to design requirements and documents any mechanical installations that do not work. But what if he is working for the owner and not the General Contractor?

Rules and Tactics

Let’s go back to the assumption that the Contract Documents are the Rules in the Construction Phase of this project. What else could be rules? There could be some unanticipated safety or access issues that must be addressed. Is it a rule to be honest at the table during commissioning meetings? No, but it is probably a rule to keep one’s word if something is agreed upon in front of the others. If the General Contractor thinks he is doing work in excess of the Contract Documents, the owner could issue a written directive to get him to do what the owner needs and argue about it later. And it’s also an implied rule that there’s always the opportunity to come up with ideas and solutions that work towards achieving the OPR better than what’s described in the Contract Documents. After all, that is one of the main benefits of the commissioning process. Ironically this is a Rule to break the Rules.

As the CA, you have to be very aware of the perceptions of all of the other players. It’s not enough to think how you would evaluate the control contractor’s value if you were the mechanical contractor or the balancer. It’s figuring out what the *balancer* or the *mechanical contractor* perceives the value of the control person. This ability to see through others’ eyes is the strategy of successful negotiations, and can’t be emphasized too much. Why is that? Because you will develop your tactics for playing the game around what you imagine others perceive. You must make decisions based on your continuing analysis of an evolving situation so that you

get more. Most importantly, when you come to a game, the point is not to play the game you find. The point is to play the game you want.

Equilibrium and Getting Out of It

One good way to see how understanding Game Theory and how it can help negotiations comes when a game gets stalled. Games can come to equilibrium where no player can gain anything more without the other players changing their position. If you are getting what you want in this equilibrium, then that may be okay. Chances are you are making some concessions. (The term for this is Nash's Equilibrium, named after John Forbes Nash, the mathematician portrayed in the film A Beautiful Mind.) But the equilibrium may be undone if one party negotiates with another to make the other change. This is part of playing the game you want by figuring out what to negotiate about.

Here's an example: A man and his wife want to go out for an evening. He wants to go to a restaurant on one side of the metropolis they live in, and she wants to go to see a play on another side of the city. It's going to make for a long evening, and the wife doesn't like the restaurant and the husband doesn't want to see the play. But they each resign to do both, even though it may be a long and tiring evening for both of them. Neither one is pleased with the other and there's some animosity being developed. So that's our state of equilibrium. Each of them has a benefit in the deal with a down side, and each one isn't willing to give up what he or she wants. The focus of the situation has gone beyond the initial Game of how to spend an evening. It's now on the downside of their relationship, especially on how stubborn the other one is.

But then the husband suggests that they go to another restaurant that's closer to their house that she likes more, and go to a movie that sounds okay that he thinks his wife really wants to see. Here he is trying to think from her point of view to make her an offer she might go for, especially because it's an option that doesn't compromise her previous position too much. But that means changing his goals as well by compromising. The wife agrees to the arrangement, and they will both enjoy themselves more and a sense of harmony is restored, even though they each didn't get to have their first choice.

Right now is a time to clarify an extremely important point about needs of Game Theory and the commissioning process. Conceiving of the game and developing your strategies should not be thought as a way to dominate and manipulate others, or to get everything you want. The Commissioning Game and all of its inner games should not be considered as zero-sum games, that is, the wins and losses always add up to a value of zero. (In sports, the games between two teams or individuals are most always zero-sum games. When a sports game is played, somebody wins it completely, and somebody loses it. Poker is a zero-sum game after all of the bets are laid down.) Commissioning should be considered a positive-sum game. Our goal is to achieve positive sums and especially not negative sum games.

Making the Pie Bigger for the Other Players

One major incentive for contractors to participate willingly in the commissioning process is that they stand to gain more than if they don't. This concept certainly isn't intuitively embraced by those who haven't done it before. The CA is not going to be successful in converting those who don't believe it by proposing this concept and then trying to force everyone to follow it whether they like it or not. The challenge is for the CA to understand what the others in the Game want, and use his influence and his negotiation tactics to make the other Players understand that they should embrace commissioning to get the biggest piece of pie they can get. You are making the commissioning game one where the wins for everyone grow and the losses decrease.

The CA's focus during this particular Kick-off Meeting is not to attain Commissioning's overall goal of a quality project. His goal is really to get everyone playing the game to make quality the goal of their game too. Their pie probably translates into profit for the project, and everyone is vying for the biggest piece they can get. The CA has to make the total pie bigger so that each player's piece will be more even his percent of the pie stays the same. This is done by promoting the Total Quality Management aspects of the process. One of the results of commissioning is that work will not have to be done twice if a contractor is guided with a checklist that lists all of the requirements for acceptable work. That saves him money. This also helps others who are dependent on prerequisites to get their work done. That should save them money. And work whose performance is validated also results in fewer call backs. In addition, the checkout becomes more orderly and efficient.

One of the best strategies for you as a CA at the commissioning kick-off meeting is to ascertain which contractors have experienced these benefits and want to do commissioning, not because the specifications require it, but because they will be more profitable. Then when that contractor shows this willingness, you might treat him at the meeting like a partner. Tell him you'll help him with developing his tasks and guiding him on how his documents should be submitted.

You may be altering the rules by offering such help, but it may be a time to change the game to increase everyone's gains. You are offering the contractor cooperation and guidance for his efforts in the commissioning process. Right there you are changing your Added Value, not only to him, but to all of the others in the room who see that working with you could be a lot better than resisting the process. Of course, those are your tactics: you believe that the other Players will perceive this because you understand what's valuable to them. It should have a domino effect. Your scope in the meeting is to get the commissioning process underway. You've changed the game by augmenting your Added Value by offering to help some others to play better. In doing so, you've changed the game for everyone else, too. You have made the possibility of a successful job SEEM more attainable to those who partake in the process. You've made a bigger pie for them at the same time that you increased your own benefits.

A Real Life Example

This is a real life example that we'll try to break into a Game Theory structure. There were over a hundred fan coil units to commission in a new University dormitory, and the freshman students had to move in a couple of weeks. The liquidated damages were \$2000 a day, and that didn't even come close to the costs the University were going to suffer to house students in temporary digs and deal with the parents' outrage. For each room fan coil, the project specifications called for the same kind of eight page start-up form typically used for a large air handler. To deal with the actual needs of the job at the point that the units' start-up was imminent, the CA developed a matrix checklist that allowed the contractor to quickly and repetitively check the unit on the most essential items (support, access, piping connections). He negotiated the acceptance of this method both with his own inspectors and project management team and the General Contractor as well.

One of the stipulations of going to this method was that if spot-checking by the University turned up consistent problems, the longer checklists would be invoked. Although this was a compromise from the Specifications, there were clearly bigger advantages for everyone. For the University, standard commissioning using a long checklist for a very thorough scrutiny of each fan coil was secondary to meeting a deadline that had no low-cost alternatives. The mechanical contractor would be relieved of working day and nights to commission the units in the specified way (which probably will be short-cutted or not be correct when done at 2:00 am in the morning), but the threat of returning to the specified methods still kept him focused on making sure the checkout ensured quality. The general contractor was spared the cost of the liquidated damages and all of the problems and rancor of dividing up the costs among his subs. The CA knew the Scope of the Game extended beyond the completion of the building in accordance to the specifications. In other words, he saw a different game, saw how his role could be used in the negotiations for change, and then altered the rules to try and win.

In order to begin a strategy for negotiating using the above situation, we could try to set up this a mathematical Game Theory model. We could start by establishing the values of the contributions of the Players in the Game at this point to the success of the commissioning process.

Player/Value	Fights all of the way	Somewhat Non Cooperative	No Help; No Harm Neutral	Good Follower	Cooperative	Advocate of Cx
General Contractor	-10	-8	-4	-2	4	10
Mechanical Contractor	-8	-6	-2	-1	4	10
A&E Representative (Commissioning Authority)	-10	-10	-4	-4	8	10
Housing Department at	-10	-8	0	0	5	5

Player/Value	Fights all of the way	Somewhat Non Cooperative	No Help; No Harm Neutral	Good Follower	Cooperative	Advocate of Cx
University						

Based on the above, we can predict the CA has to be committed to consensus and the commissioning process. The huge problem here is that these values are not empirical but subjective. It is impossible to set quantifiable values the same way economic exchanges may have. The actions of one player will affect the way others play the game and thus their “values”. So until one is willing to calculate a lot of iterations, the use of this model is not useful to us. It is largely an academic exercise.

If we structure the game using the less formal structures discussed above, we may come up with a far more revealing chart.

Player	Added Value	Rules	Tactics	Scope
General Contractor	Controls His Contractors Delivery of Functional Dormitory	Job Documents	Can find ways to claim delays Can resort to legal actions and appeal to University Officials	Total Project Delivery In Accordance with Job Documents and Make a Profit
Mechanical Contractor	Provides Equipment Per Specifications	Job Documents	Tight Schedule May Mean Some Leniency in Time-consuming Paper Work	Provide Mechanical Equipment In Accordance with Job Documents and Make a Profit
A&E Representative (Commissioning Authority)	Oversees Contractor Work, Can Change Rules Believes in Consensus, Win-win Situations	Can Alter Official Rules (Rule Breaker)	Consensus Builder Must find way to satisfy all parties	Responsibility to Facilitate the Achieving of Project Intent
Housing Department at University	Ultimate Project Acceptor	Can Request Changes	Emphasizes Costs and Damage if Project Is Not Completed before Deadline	Acceptance of Functioning Dormitory

Here we can see the relationships and possible “plays” by the different participants. For example, the Added Value of the General Contractor is the party that will best provide the final scope of the Housing Department. That puts the Value of the contractor in high perspective, and makes the Commissioning Authority very aware that the most important thing he needs to do is keep the contractor on track to deliver his project successfully.

The Tactics column also is helpful to the Commissioning Authority because it allows him to keep in mind the negotiation angles implicit in the other parties. With this understanding he realizes how he must play his game and where the others’ perceived strengths are. Game Theory does not provide the actual matters to negotiate about. Rather it gives an awareness of the

dynamics going on. Yet even here there is a caveat: in the example above, the grid is populated from one person's point of view at a particular point in time. Fortunately the awareness of this Game Theory structure encourages constant scrutiny of a dynamic situation and adjustments in this point of view.

Conclusion

Most of these kinds of interplays commonly occur without arranging them into any kind of formal game structure. During the Commissioning Process on any project, bargains are made, alliances formed, and some will win more than others. But an awareness of the components of Game Theory can help the CA to have better negotiations and a better focus on not only on what he wants, but what is also achievable at the moment. If the CA gets caught up in the all of the strategies and the whirlpool of conniving and counter-acting tactics just for the sake of getting the advantage of someone else, he's ultimately only hurting himself. In the course of playing the thousands of Games that take place in the commissioning process, THE most reliable goal to guide the CA is the idea that commissioning is a quality-based process, and the goal is to gain the best quality product or process at every turn. This will make the wins for all of the other participants better and bigger.